


RIKO, d.o.o.
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CERTIFIKATI / CERTIFICATES:

ISO 9001 : 2015
ISO14001 : 2015
OHSAS 18001 : 2007
SCC** : 2011

HE Sveta Petka, Skopje, Makedonija



V podjetju **RIKO, d.o.o.** razvijamo in nudimo celovite rešitve za uvedbo modernih, učinkovitih in okolju prijaznih tehnologij v najrazličnejših industrijah, še zlasti v avtomobilski, traktorski in letalski industriji ter na področju energetike, okoljevarstva, logistike in gradbeništva.

Z visoko usposobljeno ekipo strokovnjakov, celostnim naborom storitev in zanesljivim konceptom upravljanja zagotavljamo kakovostne in ekonomsko upravičene rezultate projektov ter gradimo dolgoročno zaupanje naših naročnikov in partnerjev.

STORITVE:

Smo uveljavljeni partner za izvedbo najzahtevnejših projektov od idejne zasnove ter svetovanja do implementacije rešitev. Naši strokovnjaki skrbijo za izdelavo konceptov novih proizvodnih linij, projektiranje, dobavo, montažo in zagon tehnološke opreme in naprav ter usposabljanje naročnikovega kadra. Nudimo servisiranje in podporo v garancijski dobi ter zagotavljamo ustrezno financiranje projekta.

Podjetje RIKO, d.o.o. je izkušeno in uveljavljeno podjetje zlasti za izdelavo projektov „na ključ“ na področju tehnološkega inženiringa, energetike, okoljevarstva, logističnih sistemov in gradbeništva.

Inženirske rešitve ustvarjamo na podlagi številnih izkušenj lastnega razvoja in izdelave opreme, pa tudi na osnovi izkušenj mnogih evropskih proizvajalcev, ki so vključeni v partnerstvo s podjetjem Riko.

Uspešni projekti in sodelovanja so podjetju Riko prinesli dober sloves doma in nas trdno zasadili na tržiščih Ruske federacije, Belorusije, Ukrajine, Makedonije in Evropske unije.

*Company **RIKO, d.o.o.** develops integral solutions using efficient, state-of-the-art, and eco-friendly technologies for various industries, including the automotive, tractor, and aircraft industries, as well as the energy, environmental protection, logistics, and construction sectors. Our highly qualified teams of experts provide comprehensive services and strong management concepts designed to deliver excellent but economical results, which in turn has earned us the long-term trust of customers and partners alike.*

SERVICES:

We are established company for execution the most challenging projects from the idea concept and consulting to the implementation of solutions. Our experts oversee making concepts of new production lines, design, supply, installation and commissioning of technical equipment and devices as well as staff training. We deliver warranted service and support and take care of financing coordination and assistance.

Company RIKO d.o.o. is experienced and well-established company especially for executing turn-key projects in the field of technological engineering, energy, environment, logistic systems and civil engineering.

Our engineering solutions are based on a wealth of experience with products and equipment from a wide range of European manufacturers associated with the Riko group, as well as with other renowned flagship companies all over the world.

An extensive array of successful projects and collaborative undertakings has earned us an excellent reputation and solid market position in the Russian Federation, Belarus, Ukraine, Macedonia, and the European Union.

RLS d.o.o.



RLS d.o.o.
Pod vrbami 2
1218 Komenda
Slovenija, EU

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mail@rls.si
www.rls.si

CERTIFIKATI / CERTIFICATES:
ISO16949 Letter of Acceptance

RLS razvija in proizvaja magnetne dajalnike pomika in zasuka za uporabo v številnih panogah. Že od leta 1989 je njihova misija odkrivati rešitve za rabo v različnih okoljih. Ne glede na to, ali gre za robotiko, elektromotorje, industrijsko avtomatizacijo, tiskalnike, orodjarstvo, medicino, industrijo obnovljivih virov, vesoljsko in podmorsko uporabo, naši dajalniki delujejo še v tako zahtevnih razmerah.

RLS je v partnerskem odnosu s podjetjem Renishaw, ki je dejavno zlasti na področjih merjenja, krmiljenja pogonskih sistemov, zdravstva, spektroskopije in proizvodnje ter ki prek svoje obširne prodajne mreže prodaja magnetne dajalnike RLS in kupcem nudi podporo. RLS napredne senzorske rešitve nudi na evropskih, ameriških in azijskih trgih ter sodeluje z vodilnimi svetovnimi podjetji in blagovnimi znamkami iz različnih panog.

PROIZVODI / STORITVE:

Magnetni senzorji pomika in zasuka.

RLS is the world renowned developer and producer of magnetic encoders for a broad range of industries. Since 1989, RLS has been on a mission to make encoder solutions that fit into various applications and environments. Whether in robotics, electric motors, industrial automation, printing, machine tool, medical, green energy, aerospace and submarine applications, our encoders comply with even the toughest requirements.

RLS is an associate company of Renishaw, a global company with core skills in measurement, motion control, healthcare, spectroscopy and manufacturing, and which sells and supports RLS magnetic encoders through an extensive global network. RLS strives to deliver advanced sensor solutions in European, American and Asian markets working with world leading companies and brands from various industries.

PRODUCTS & SERVICES:

Magnetic linear and rotary encoders.



Robotina d.o.o.

Robotina d.o.o.

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Robotina že skoraj 30 let uspešno deluje na področju avtomatizacije in v zadnjem obdobju tudi na področju digitalne transformacije.

Sprememba poslovnih modelov, ki jo prinaša industrija 4.0, kjer je vse povezana storitev zahteva od dobaviteljev opreme in storitev, da imajo pod neprestanim nadzorom (real time) ne le svoje proizvodne procese, ampak tudi svoje izdelke, ki jih ponujajo kot storitev. Robotina s svojim znanjem in izkušnjami pomaga svojim partnerjem pri vpeljavi procesov digitalne transformacije na vseh nivojih: od senzorjev na nivoju naprav, preko nadzornih sistemov (SCADA) do algoritmov umetne inteligence (ML, COS,..). Na ta način združujemo tako "operation technology" (OT), "information technology" (IT) in Industrial Internet Of Things (IIoT). Enostavno povedano krmilne sisteme povežemo v celoto in omogočamo lokalno ali daljinsko obvladovanje skozi celotno obdobje uporabe.

Z lastno tehnologijo lahko zagotovimo celovito rešitev, z znanjem in izkušnjami pa svojim partnerjem omogočamo zanesljive in dolgotrajne rešitve, ki jih je vedno možno nadgraditi in povezati z ostalimi sistemi. Tako poleg vrhunске opreme, zanesljive programske opreme in prilagojene rešitve, dobijo tudi najnižji možen strošek celotnega življenjskega cikla (Total Cost of Ownership).

Rešitve industrije 4.0. imamo v več industrijskih branžah, med drugim v prehranski, procesni, predelovalni, metalurgiji, kemični industriji in strojogradnji. Poleg samih industrijskih procesov uvajamo tudi podporne, kot so upravljanje proizvodnih in poslovnih stavb, energetska učinkovitost, obnovljivi viri in sistemi za upravljanje z energijo. Zagotavljamo povezljivost na MES in ERP.

*For almost 30 years, **Robotina** has been successfully working in the field of automation and recently also in the field of digital transformation.*

The change of business models brought by industry 4.0, where all related services require suppliers of equipment and services to have, under real-time control, not only their production processes, but also their products that they offer as a service. Robotina with its knowledge and experience helps its partners to implement digital transformation processes at all levels: from device level sensors, SCADA to artificial intelligence algorithms (ML, COS,..). In this way we combine "operation technology" (OT), "information technology" (IT) and Industrial Internet Of Things (IIoT). Simply stated, the control systems are integrated into a whole and allow local or remote control over the entire period of use.

With our own technology we can provide a comprehensive solution. With our knowledge and experience, we provide our partners with reliable and long-lasting solutions, which can always be upgraded and connected with other systems. Thus, in addition to state-of-the-art equipment, reliable software and customized solutions, they also get the lowest possible cost of the Total Cost of Ownership.

Solutions Industry 4.0. we have in several industrial branches, including food, processing, metallurgy, chemical industry and machine building. In addition to the industrial processes itself, we also introduce supportive measures such as managing production and business buildings, energy efficiency, renewable resources and energy management systems. We provide connectivity to MES and ERP.

SMM proizvodni sistemi, d.o.o.



SMM proizvodni sistemi, d.o.o.

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CERTIFIKATI / CERTIFICATES:
ISO 9001:2015 (certificirano / certified in 1997)
ISO 14001:2015 (certificirano / certified in 2003)
ISO 18001:2007 (certificirano / certified in 2006)

Družba **SMM d.o.o.** razvija program in poslovni koncept, ki omogoča naslavljanje težjih nalog v proizvodnji v različnih industrijah povsod po svetu. V sodelovanju z uporabniki izvajamo projekte „na ključ“, ki zajemajo strojništvo, avtomatizacijo in informatiko.

Uspešno izpolnjevanje pričakovanih naših partnerjev zagotavljajo z izkušnjami, znanjem in razvojno energijo več kot sto strokovnjakov na področju mehatronike ter programskih rešitev.

Izvajamo projekte s področja proizvodnih sistemov. Princip modulare gradnje nam omogoča izvajanje projektov na osnovi lastne dokumentacije in vključevanje proizvodov svetovnih proizvajalcev ter s tem fleksibilnost pri izbiri najustreznejših rešitev.

V podjetju SMM d.o.o. poskrbimo za izvedbo vseh življenjskih faz naših produktov. Začne se z načrtovanjem, ki poteka v sodelovanju z naročnikom. Nato izdelek razvijemo ter naročnikom pomagamo pri izvajanju in uporabi. Poskrbimo za podaljševanje uporabnosti, saj izdelke servisiramo in jih po potrebi moderniziramo. Po odsluženem življenjskem obdobju izvedemo še reciklažo.

Sami izvajamo poslovni in programski razvoj. V sodelovanju z našimi naročniki in uporabniki storitev izvajamo tudi zaključene projekte (t.i. "projekti na ključ") s področja strojništva, avtomatizacije in informatike. S pridobljenim znanjem in izkušnjami ter prilagodljivostjo in razvojno energijo uspešno izpolnjujemo še tako visoka pričakovanja.

V skladu z razvojnim konceptom smo oblikovali prodajni program, prilagojen zahtevam trga: 70 % inženiring (lastna dokumentacija), 20 % storitve (naročnikova dokumentacija), 10 % prodaja (proizvodi partnerjev).

SMM Ltd. independently implements the business and program development. In cooperation with our partners and customers, we produce finished, ready-to-use products and projects from the field of mechanical engineering, automation and informatics.

Our experience, knowledge, development power and adaptability allow us to successfully fulfill the expectations of our clients.

Our company implements various projects in the field of production systems. Our method of modular construction allows us to complete projects, based on our own documentation. Often, we include components of world-renowned companies, which results in the most flexible and appropriate solutions.

At SMM d.o.o., we are proud to be able to see our projects through all life cycles. The production starts at the drawing board, where we plan our products with the client's input. Later, we develop and build the product and provide our client with valuable support (setup, adjustments, personnel training).

We always offer our customers the best possible experience and production efficiency by servicing our products and upgrading them, if necessary. After our products are worn out and obsolete, we also arrange the recycling and safe disposal. We provide both the operation and program development. In collaboration with our customers and service users, we also prepare finalized projects in the fields of mechanical engineering, automation and information technology. With the obtained knowledge, experience, flexibility and development energy, we successfully comply the toughest criteria and expectations.

In accordance with our development concept, our product range is specially tailored to the market's needs: 70 % engineering (own documentation), 20 % services (customer's documentation), 10 % representation (partner's products)



STELEM d.o.o. Žužemberk

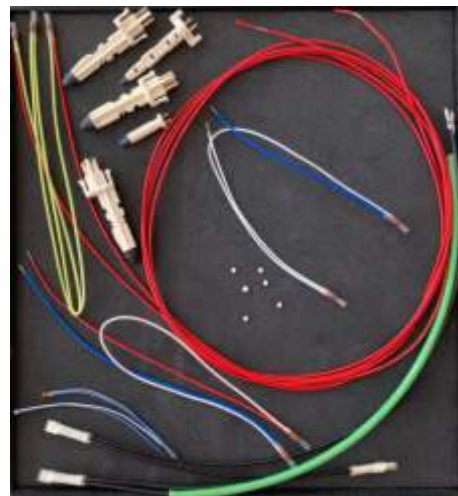
STELEM d.o.o. podjetje za proizvodnjo, trgovino in promet

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Nelinearni keramični upori



PTC temperaturni senzorstvi

STELEM d.o.o. Žužemberk se nahaja v idiličnem okolju na bregovih reke Krke, kjer delujemo že od leta 1992.

Smo eno redkih podjetij v Evropi za proizvodnjo PTC keramičnih komponent, ki se uporabljajo kot samoregulirni električni gredni elementi, temperaturni senzorstvi, omejitelji električnega toka idr. Vgrajujejo se v elektronske sklope in naprave.

Naša strategija sloni na dolgoročnem razvojnem, mnogokrat ekskluzivnem povezovanju z našimi kupci ter razvoju kompetenc in motiviranosti naših zaposlenih. Pri tem stremimo k čim manjšemu obremenjevanju okolja.

Smo zanesljiv razvojni partner.

Stalne izboljšave naših procesov slonijo na vedno večjih zahtevah naših kupcev in potrebah po izboljševanju delovnih pogojev naših zaposlenih.

Podjetje se nenehno prilagaja tržnim razmeram, kar je tudi ena naših strateških prednosti.

Naši kupci prihajajo iz avtomobilske industrije, s področij industrijske elektronike, elektroenergetike, bele tehnike, regulacijske tehnike in medicinske tehnike. Večino prodaje opravimo na evropskem trgu.

PROIZVODI / STORITVE:

- nelinearni keramični upori s pozitivnim temperaturnim koeficientom (PTC),
- PTC temperaturni senzorstvi,
- skozni keramični kondenzatorji in filtri.

STELEM d.o.o. Žužemberk is located in an idyllic setting on the banks of the Krka River, where we have been operating since 1992.

We are one of the few companies in Europe to manufacture PTC ceramic components that are used as self-regulating electrical heating elements, temperature sensors, and integrated into electronic assemblies and devices.

Our strategy is based on long-term strategic development, many times as exclusive supplier to our customers, as well as on the development of competencies and motivation of our employees. We strive to minimize the environmental burden.

We are a reliable development partner.

Continuous improvements to our processes are driven by the increasing demands of our customers and the need to improve the working conditions of our employees.

Our constant adjusting to market conditions, is one of our strategic strengths.

Our customers come from the automotive industry, in the areas of industrial electronics, power engineering, white goods, regulatory techniques and medical technology. Most of our products are sold on the European market.

PRODUCTS & SERVICES:

- self-regulating PTC heating elements,
- PTC temperature sensors,
- feed through ceramic capacitors and filters.

Talum Tovarna aluminija d.d. Kidričevo



Talum Tovarna aluminija d.d. Kidričevo

Tovarniška cesta 10
2325 Kidričevo
Slovenija, EU

+386(0)2 799 51 00
www.talum.si

Talum je sodobno podjetje, ki se že 65 let ukvarja s proizvodnjo aluminija. V tem času je postalo eno najbolj učinkovitih proizvajalcev primarnega aluminija, aluminijevih zlitin, največji evropski proizvajalec rondelic ter razvojni dobavitelj ulitkov avtomobilski industriji. Uvršča se med 10 največjih slovenskih izvoznih podjetij. Rast in konkurenčnost zagotavlja vlaganje v razvoj najsodobnejših tehnologij, orodjarstvo ter lasten inženiring, ki uvaja napredne in inovativne tehnološke rešitve za proizvodnjo dovršenih aluminijevih izdelkov. Talumov strateški cilj je doseganje višje dodane vrednosti svojih produktov z inovativnostjo in razvojnimi partnerstvi. To dosega z nenehnim uvajanjem sodobnih metod in postopkov vodenja proizvodnih procesov ter z visoko stopnjo avtomatizacije in robotizacije.

Talum se vedno bolj uveljavlja tudi kot ponudnik različnih storitev od katerih je v ospredju trženje lastnih proizvodnih naprav in tehnoloških rešitev za proizvodnjo in predelavo aluminija.

PROIZVODI / STORITVE:

- proizvodnja aluminija,
- strojogradnja,
- industrijska in procesna avtomatizacija,
- robotizacija.

CERTIFIKATI:

ISO 9001:2015 Quality systems
ISO 14001:2015 Environmental management
OHSAS 18001:2007 Health and Safety Systems
IATF 16949 Quality systems in automotive
EN 1090-1:2007 Components for Steel Construction

Talum is a modern aluminum production company, with 65 years of tradition. It is one of the most efficient manufacturers of primary aluminum, aluminum alloys, Europe's leader in slugs production and a development supplier of the castings parts for automotive industry. Talum is ranked among the 10 largest Slovenian export companies. Growth and competitiveness are ensured by investing in development state-of-the-art technologies and competent engineering group, which introduces advanced and innovative technological solutions for the manufacturing of aluminium products. Talum's strategic goal is increasing the added value of its products through innovation and development partnerships. It achieves this by constantly introducing of modern methods of process control and by a high degree of automation and robotization.

Talum is also positioning in market as a provider of various services, focusing offer the own machinery and technological solutions for aluminum industry.

PRODUCTS & SERVICES:

- aluminium production,
- machine building,
- industrial and process automation,
- robotisation.

CERTIFICATES:

ISO 9001:2015 Quality systems
ISO 14001:2015 Environmental management
OHSAS 18001:2007 Health and Safety Systems
IATF 16949 Quality systems in automotive
EN 1090-1:2007 Components for Steel Construction

**TELEM inženiring, avtomatizacija,
zastopstva d.o.o.**

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CERTIFIKATI / CERTIFICATES:

ISO 9001
IZS – ID-0414
R&D ID-2325
Siemens partner, Schneider Electric partner, KNX partner



Osnovna dejavnost podjetja **Telem d.o.o.** je inženiring in avtomatizacija sistemov v sledečih panogah:

- procesna industrija (papirna, kemična, avtomobilska, gradbena, metalurška, farmacevtska, prehrabena ...),
- ekologija (čistilne naprave, sortiranje odpadkov, filtracije in čiščenje zraka ...),
- energetika (hidro, biomasa, kogeneracija, naftna&plin, nuklearna),
- infrastruktura (smučarske naprave, komunikacije, logistika),
- avtomatizacija zgradb (pametne zgradbe, HVAC, toplotne postaje, temperatura, vlaga ...),
- e-mobilnost (polnilne postaje, integracija in pametna poraba,...),
- R&D (RRI projekti ...).

Zastopstva: Solution partner Siemens, Schneider Electric, KNX, Rittmeyer, Abitron

PROIZVODI / STORITVE:

- elektro projekti od ideje, izvedbe do zagona,
- avtomatizacija tehnoloških sistemov,
- IKT – HW&SW, aplikacije,
- elektro oprema (PLC, HMI, SCADA, pogonski sistemi, strojni vid, procesno merilna oprema...),
- pametne zgradbe, E-mobilnost,
- R&D projekti.

*The core business of company **Telem d.o.o.** is the engineering and system automation of the following industries:*

- *Process industry (Paper, Chemical, Automotive, Construction, Metallurgical, Pharmaceutical, Food and Beverage),*
- *Ecology (Waste treatment, Waste sorting, filtration and air purification),*
- *Energetics (Hydro, Biomass, Cogeneration, Oil & Gas, Nuclear),*
- *Infrastructure (Ropeways, communication solutions, logistic solutions),*
- *Building automation (smart buildings, HVAC, heat stations, temperature, humidity...),*
- *E-mobility (Charging stations, Integration, and Smart power consumption).*

Representations: Solution partner Siemens, Schneider Electric, KNX, Rittmeyer, Abitron

PRODUCTS & SERVICES:

- *electrical projects from idea, performance to start up,*
- *automation of technological systems,*
- *ICT - HW&SW, applications,*
- *electrical equipment (PLC, HMI, SCADA, drive systems, machine vision, process measuring equipment...),*
- *smart buildings, E-mobility,*
- *R&D projects.*

TERMO SHOP d.o.o.



Termo Shop d.o.o.

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Naše podjetje in njegova energetska neodvisnost

Termo Shop, d.o.o. je vodilno slovensko podjetje, na trgu prisotno že 29 let. Specializirani smo za razvoj, proizvodnjo, prodajo, montažo ter servis energijsko varčnih toplotnih črpalk visoke kakovosti in ostalih celostnih rešitev. Dolgoletna tradicija je rezultat izkušenih strokovnjakov, trdega dela, postavljanje stranke v ospredje.

Vsak dan nas pri delu vodi vizija našega podjetja: Proaktivno povezujemo obnovljive vire v učinkovito in varno prihodnost. Naša zgodba izhaja iz misije, da ne samo sledimo, ampak tudi gradimo prihodnost. Da verjamemo v to, kar počnemo, najbolj pove dejstvo, da tudi sami živimo zgodbo o obnovljivih virih energije in energetske neodvisnosti. Predani smo odličnosti, kar dokazuje Platinasto bonitetno odličje. V letu 2020 pa smo postali tudi pooblaščenči ogrevalni partner Mitsubishi Electric.

Vedno se trudimo slediti trendom, in verjamemo, da energetska preobrazba zajema več kot le toplotno črpalko in sončno elektrarno. Zato svojim končnim strankam, kot tudi poslovnim subjektom, celovito pomagamo pri rešitvah, kot so: sistemi za ogrevanje in hlajenje s toplotnimi črpalkami, prezračevanje, celovite rešitve z integracijo sončnih elektrarne, celovite trajnostne rešitve energetske oskrbe (polnilnica, baterija, hibridni sistemi), sistemi za izrabo toplotne energije ter celovito upravljanje.

***Termo Shop, d.o.o.** is a leading Slovenian developer and manufacturer of heat pump solutions that has been present on the market for 29 years. We specialize in the development, manufacture, sales, installation, maintenance and servicing of energy-saving heat pumps of high quality and other integrated solutions. A long tradition is the result of experienced professionals, hard work and always putting the customer first.*

Every day we are guided by the vision of our company: We proactively connect renewable resources to an efficient and secure future. Our story is rooted in our mission to not only follow, but also to build the future. We believe in what we are doing - which is most evident from the fact that we ourselves are living the story of renewable energy and energy independence. We are committed to excellence, result of which is prize awarded by Bisnode Dun & Bradstreet – Bisodes credit rating AAA. In 2020, we also became an authorized heating partner of Mitsubishi Electric.

At Termo Shop we always strive to follow trends, and we believe that energy transformation encompasses more than just a heat pump and a solar power plant. Therefore, we provide comprehensive solutions for our customers, such as: heating and cooling systems with heat pumps, ventilation, complete solutions with the integration of solar power plants, comprehensive sustainable energy supply solutions (charging stations, solar batteries, hybrid systems), thermal energy systems and smart grid management.



Tricikel d.o.o.

Tricikel d.o.o.

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Tricikel d.o.o. je partner skupine Software AG v Sloveniji in vodilni ponudnik celovitih rešitev za obvladovanje poslovnih procesov, enotnega sistema upravljanja organizacije in poslovnih digitalnih dvojčkov.

Svoje konkurenčne prednosti gradimo na več kot dvajset letih izkušenj delovanja na projektih v Sloveniji, Evropi in Bližnjem vzhodu ter dobrem poznavanju rešitev, orodij in metodologij za:

- celovito obvladovanje poslovnih procesov,
- obvladovanje tveganj in skladnosti z zakonodajo
- procesno rudarjenje,
- robotsko procesno avtomatizacijo.

Tesna povezava s skupino Software AG in partnerji nam odpira dostop do najnovejših znanj in metodologij na področjih poslovnega svetovanja ter svetovanja pri procesno usmerjeni vpeljavi modernih poslovnih informacijskih sistemov.

PROIZVODI / STORITVE:

Šolanje, svetovanje in vodenje

Rešitve na osnovi orodij:

- ARIS
- ARIS Risk&Compliance Manager
- ARIS Process Mining
- ARIS RPA

Tricikel d.o.o. is Software AG partner in Slovenia with more than 23 years of experience in the field of business process management, enterprise management systems and business digital twins.

We provide high quality services and solutions covering:

- enterprise business process management,
- risk and compliance management
- process mining,
- robotic process automation.

Our solutions are based on ARIS platform tools, proven methodologies and extensive in-house knowledge gathered and proved on projects across all industries in Slovenia, SE Europe and Middle East.

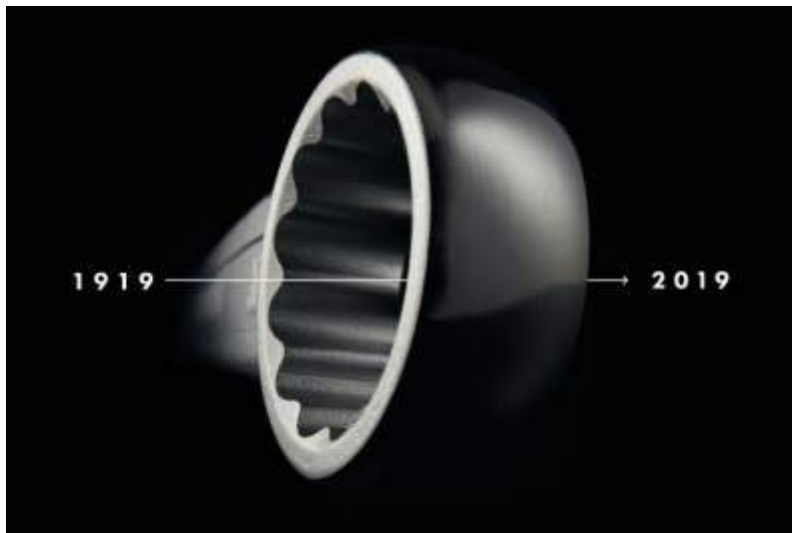
PRODUCTS & SERVICES:

Trainings, consulting and coaching

Solutions based on:

- ARIS
- ARIS Risk&Compliance Manager
- ARIS Process Mining
- ARIS RPA

UNIOR d.d.



UNIOR Kovaška industrija d.d.

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CERTIFIKATI / CERTIFICATES:

ISO 9001, ISO 14001,
QS 9000, ISO/TS 16949, ATF 16949, VDA 6.4,
OHSAS 18001,
IEC 60900, GOST PCT, CE,

Tisočletja učenja in izkušenj so botrovala uradnemu začetku in nadaljnjemu razvoju podjetja Unior. Leta 1919 bila ustanovljena Štajerska železno industrijska družba z omejeno zavezo, krajše Štajerska Zreče. Sedanje ime, ki je skovanka besedne zveze **UN**Iverzalno **OR**odje, je podjetje dobilo v 70. letih prejšnjega stoletja.

Danes večino izdelkov, kar 95%, izvozimo. V zadnjih tridesetih letih razvoja smo se uveljavili kot pomemben razvojni partner evropske avtomobilske industrije. Uvrščamo se med pet največjih slovenskih proizvajalcev, po številu zaposlenih pa med deset največjih slovenskih podjetij.

Za ojnice in dele krmilnih mehanizmov za avtomobilsko industrijo smo ena največjih kovačnic v Evropi in največji svetovni proizvajalec odkovkov za krmilne mehanizme osebnih vozil. Kar štirje od petih avtomobilov v Evropi imajo vgrajen vsaj en del, narejen v Uniorju.

Sodimo v sam vrh, med pet najpomembnejših evropskih proizvajalcev ročnega orodja, katerega razvoj usmerjamo k specialističnim rešitvam. Posebno ponosni smo na proizvodno linijo kolesarskega orodja, s katero stojimo na samem svetovnem vrhu. Postali smo globalno prepoznaven proizvajalec namenskih obdelovalnih strojev CNC za serijsko obdelavo jeklenih ali aluminijastih odlitkov ter odkovkov.

Na različnih področjih delovanja smo uvedli ugledne certificirane sisteme: ISO 9001 in ISO 14001 (sistem vodenja kakovosti), QS 9000, ISO/TS 16949 in ATF 16949 (za program Odkovki), VDA 6.4 (za program Strojna oprema), OHSAS 18001 (sistem vodenja varnosti in zdravja pri delu).

Pridobili smo tudi pomembna potrdila o ustreznosti naših izdelkov in storitev: IEC 60900 (za orodje za delo pod visoko napetostjo), GOST PCT (za ustreznost ročnega orodja), CE (oznaka o skladnosti za stroje), potrdilo o uvedenem sistemu po zahtevah HACCP, osnovni certifikat Družini prijazno podjetje.

Several thousand years of know-how led to the official founding and further development of Unior whose beginnings date back to as early as 1919 when the limited-liability Styrian Iron Industrial Company was established. The current name, which is coined from the "UNIverzalno ORodje" (UNIOR - Universal Tools) phrase, dates back to the 1970s.

Today, the majority of products, as many as 95%, are exported. During the last 30 years of development, we have established ourselves as an important partner of the European automotive industry. We are one of the five biggest Slovenian manufacturers and one of the top ten employers in Slovenia.

We have become one of the largest European forges of connecting rods for engines and forged elements of steering mechanisms and chases used in passenger cars. Four out of five cars in Europe contain at least one Unior-produced part. We are one of the top 5 European producers of hand tools whose development is focused on specialised solutions. We are especially proud of the production line of our biking tools which is one of the best in the world.

We have become a globally renowned producer of CNC special-purpose machine tools for serial machining of steel and aluminium castings and forgings. We strive for state-of-the-art solutions in all aspects and also seek to efficiently control our quality. For this reason, we have introduced renowned certification systems in various areas of our operation: ISO 9001 and ISO 14001 (Quality Management System), QS 9000, ISO/TS 16949 and ATF (for the Forge Programme), VDA 6.4 (for the Special Machines Programme), OHSAS 1800 (occupational safety and health management system). We have received important certificates on compliance of our products and services: IEC 60900 (for tools used for working at high voltage), GOST PCT (hand tools approval certificate), CE (conformity of machinery), Certificate on the introduction of a system compliant with the HACCP requirements, basic certificate Family Friendly Company.

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Vacutech je vodilno slovensko podjetje v proizvodnji vakuumskih sistemov in komponent. Imajo več kot 30 let izkušenj na področju razvoja in izdelave vakuumskih sistemov po meri, izdelave specialnih komponent iz nerjavnega jekla ter specialnega varjenja komponent iz nerjavnega jekla. Proizvajajo širok nabor vakuumskih komponent kot so vakuumske prirobnice, prevodnice in priključki, kotni in ploščni ventili, membranske ter oljne difuzijske črpalke, HV in UHV komore.

PROIZVODI / STORITVE:

- Razvoj in izdelava vakuumskih sistemov za uporabo v industrijskih in razvojno-raziskovalnih aplikacijah
- Razvoj in izdelava vakuumskih komponent
- Svetovanje na področju vakuumskih sistemov, komponent in aplikacij
- Vgradnja in servis vakuumske opreme
- Izdelava specialnih komponent iz nerjavnega jekla



Vacutech is the leading Slovenian company in production of vacuum systems and components. The company experts have over 30 years of experience in the field of development and production of custom-designed vacuum systems, production of custom products made of stainless steel, precision welding of stainless steel components and production of special custom designed metal components. Their products include a wide range of vacuum components including vacuum flanges, fittings and feedthroughs, angle and gate valves, membrane pumps, oil diffusion pumps, HV and UHV chambers.

PRODUCTS & SERVICES:

- Custom design and production of vacuum systems for industrial and R&D applications
- Development and production of vacuum components
- Consulting in the area of vacuum systems, components and applications
- Installation and service of vacuum equipment
- Production of special stainless steel components

YASKAWA Slovenija d.o.o.

YASKAWA



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Podjetje **Yaskawa** je v Sloveniji proizvajalec in sistemski dobavitelj robotike in avtomatizacije delovnih procesov v industriji. Izdeluje sistemske in specialne aplikacije z roboti Motoman japonskega podjetja Yaskawa. Smo podjetje, ki ima 25 let izkušenj delovanja na trgu Slovenije in držav bivše Jugoslavije s široko paleto implementiranih rešitev na različnih področjih avtomatizacije, kot so npr. varjenje, montaža, strega strojev, preoblikovanje izdelkov, odstranjevanje in nanašanje materialov, pakiranje, t.i. pick&place operacije, paletiranje, ... Smo podjetje, ki dosega dvakrat višjo donosnost kapitala in prihodke na zaposlenega, kot panoga. Že danes izvozi 91 odstotkov proizvodnje in širi prodajo tako na evropskih, kot azijskih in ameriških trgih. Ob novih tržnih priložnostih na področju bio-medicine zagotavlja dolgoročno razvojno strategijo lastna registrirana razvojna skupina, ki sama ali v sodelovanju s fakultetami in inštituti razvija številne nove produktne in tehnološke modele.

Podjetje je del korporacije **Yaskawa Electric Corporation**, vodilnega proizvajalca na področju robotike, ki letno proizvede več kot 48.000 industrijskih robotov in ima skupno instaliranih več kot 430.000 industrijskih robotov, 18 milijonov servo in 27 milijonov inverterjev, ki so vključeni v različne proizvodne procese. Razvija tehnološke rešitve na področjih avtomobilske industrije, bele tehnike, kovinsko-predelovalne in livarske industrije, prehranske industrije, gradbeništva, pohištvene industrije, medicine in kozmetika.

*The **Yaskawa** company in Slovenia is a producer of robots and system supplier of robotics and automation of work processes in the industry. It manufactures system and special applications with Motoman robots, which are being produced by a Japanese company Yaskawa. We are a company with 25 years of experience in the market of Slovenia and countries of the former Yugoslavia with a wide range of implemented solutions in various fields of automation, such as, welding, assembly, machine operating, product transformation, removal and application of materials, packaging, i.e. pick&place operations, pallet-stacking etc. We are a company that achieves twice the return on capital and income per employee in comparison with other companies in the industry. It exports as much as 91 percent of its production and is expanding its sales to European, Asian and American markets. In addition to new market opportunities in bio-medicine, a long-term development strategy is provided by its own registered development group, which, in cooperation with faculties and institutes, develops numerous new product and technology models.*

*The company is part of the **Yaskawa Electric Corporation**, a leading robotics manufacturer that produces more than 48,000 industrial robots annually and has over 430,000 industrial robots, 18 million servomotors and 27 million inverter involved in various production processes. It is engaged in developing technological solutions for the automotive industry, white goods, metal processing and casting industry, food industry, construction, furniture industry, medicine and cosmetics.*



Fotografija: arhiv Yaskawa Slovenija / *photo: the archives of Yaskawa Slovenia*



Institut „Jožef Stefan“, fotografija: Arne Hodalič in Katja Bidovec / Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

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- 102 UL FS Laboratorij za lasersko tehniko (LASTEH)
- 103 UL FS Laboratorij za tehnično kibernetiko, obdelovalne sisteme in računalniško tehnologijo (LAKOS)
- 104 UL FS Laboratorij za fluidno tehniko (LFT)
- 105 UM FERI Inštitut za robotiko
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GZS - Zbornica elektronske in elektroindustrije



Zbornica elektronske
in elektroindustrije



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Zbornica elektronske in elektroindustrije (ZEE) je samostojno, prostovoljno, nepridobitno, interesno združenje pravnih in fizičnih oseb, ki na trgu opravljajo pridobitno gospodarsko dejavnost v elektronski in elektroindustriji, njima sorodnim dejavnostim ter z njima povezanih storitev. Deluje v okviru Gospodarske zbornice Slovenije (GZS).

ZEE je organizirano z namenom, da v interesu svojih članic oblikuje stališča in politiko do socialnih partnerjev, zakonodajnih in vladnih institucij ter drugih domačih in mednarodnih asociacij. Članicam zbornice ZEE zagotavlja strokovno pomoč v obliki informiranja, svetovanja, usposabljanj ter zastopanja in posredovanja predlogov. ZEE izvaja strokovne aktivnosti v sistemu javnih pooblastil, ki jih GZS prevzema v okviru zakonodaje. Poudarek aktivnosti je na pospeševanju projektov Industrije 4.0 in pri oblikovanju vrednostnih verig Industrije 4.0. V ta namen je GZS ZEE ustanovila Grozd Pametne tovarne.

Grozd Pametne Tovarne pomaga podjetjem pri oblikovanju projektne ideje in konzorcija za prijavo na konkreten razpis iz področja Pametnih tovarn.

Nacionalna točka ETIM za pospeševanje digitalizacije izdelkov, odpiranje novih prodajnih kanalov proizvajalcem elektro in elektronske opreme in tudi drugih.

I 4.0 sprint: delavnica po metodi Design Thinking v podjetju s katero v podjetju oblikujemo njihov projektni predlog za Industrijo 4.0.

Dogodek "Odpiramo 4.0 vrata" - namenjen primarno MSP ponudnikom I4.0 storitve.

Napovedovanje I4.0 kompetenc za ključne profile podjetja in priprava kariernih načrtov po metodologiji KPZ.

Electronic and Electrical engineering Association (EEIA) is an independent, voluntary, non-profit, interest association of legal and natural persons who perform a profitable economic activity in the electronic and electrical industries and related activities and services. It operates within the Chamber of Commerce and Industry of Slovenia (CCIS).

The EEIA is organized in order to formulate positions and policies in the interest of its members towards the social partners, legislative and governmental institutions and other domestic and international associations.

EEIA provides to its members expert assistance in the form of information, counseling, training, representation and transmission of proposals. The EEIA carries out professional activities in the system of public authorizations that are taken over by the CCIS in the framework of legislation.

The focus of the activity is on promoting the projects of Industry 4.0 and in the creation Industry 4.0 of value chains. To this end, the GZS ZEE has established the Smart Factory Cluster.

The Cluster of the Smart Factory helps companies in formulating a project idea and a consortium to apply for a concrete call for the Smart Factory topic.

ETIM National Point promotes product digitization and opening new sales channels to manufacturers of electrical and electronic equipment and others.

I 4.0 sprint: Design Thinking workshop in a company with the goal to formulate their project proposal for Industry 4.0.

The event "We open 4.0 doors" - intended primarily for SME I4.0 service providers.

Predicting I4.0 competencies for key company profiles and preparing career plans according to the KPZ methodology.

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www.ijs.si

Rekonfigurabilna robotska montažna celica
Reconfigurable robotized assembly cell



Odsek za avtomatiko, biokibernetiko in robotiko se na Institutu "Jožef Stefan" ukvarja z raziskovalno razvojnimi temami, ki obravnavajo značilnosti gibanja pri človeku ter njegovo povezavo z okoljem, s strojem ali tehnološkim procesom. Rezultati teh raziskav se uporabljajo v industrijski avtomatizaciji in robotizaciji kot ključnemu gradniku tovarn prihodnosti ter v različnih vejah medicine in v športu. Poleg temeljnih raziskav na teh področjih izvajamo tudi raziskave in razvoj, ki omogočajo, da se pridobljeno znanje in tehnologije čim prej prenesejo k uporabnikom tako v medicini kot tudi industriji.

Glavne smeri raziskav se nanašajo na integracijo mobilnosti in manipulacije pri industrijskih in servisnih robotih, na humanoidne robote, v tovarne prihodnosti, na študij fizioloških značilnosti človeka v različnih (ekstremnih) okoljih, na razvoj novih biomedicinskih naprav, metod in postopkov ter na problematiko avtomatizacije, robotizacije in informatizacije industrijske proizvodnje. Tako raziskave odseka vključujejo skoraj vsa področja robotike, od kinematike in dinamike mehanizmov, vodenja robotov, robotskega vida, pa do servisne robotike in biomehanike.

Izvajamo tudi zahtevne naloge avtomatizacije in robotizacije proizvodnje za tovarne prihodnosti, ki presegajo dostopne rešitve na trgu ter zahtevajo inovativne in alternativne pristope, tako v okviru evropskih kot tudi domačih projektov.

The Department of Automation, Biocybernetics and Robotics at the *Jožef Stefan Institute* deals with research and development topics that address the characteristics of human movement and its connection with the environment, the machine or the technological process. The results of these researches are used in industrial automation and robotization as a key building block for Factories of the future and in various branches of medicine and in sport.

In addition to basic research in these areas, we also carry out research and development, which enables the acquired knowledge and technologies to be passed on to users in both medicine and industry as soon as possible.

The main directions of research relate to the integration of mobility and manipulation in industrial and service robots, to humanoid robots, to factories of the future, to the study of the physiological characteristics of humans in different (extreme) environments, to the development of new biomedical devices, methods and processes, and to the problems of automation, robotization and computerization of industrial production. Our research includes almost all branches of robotics research, from kinematics and dynamics, control of mechanisms, robotic vision, up to service robotics.

We also implement demanding automatization and robotization tasks for factories of the future, which surpass standard and easily applicable solutions. We apply new, innovative, and alternative approaches to the solution, both within European and domestic projects.

IJS, Odsek za sisteme in vodenje - E2



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Diagnostični sistem za celovito končno kontrolo kvalitete elektromotornega pogona za kolesa. Institut „Jožef Stefan“, fotografija: Arne Hodalič in Katja Bidovec
Diagnostic system for holistic final quality control of electric motor drive for bicycles.
Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

Tehnologije vodenja predstavljajo združitev različnih strokovnih področij (avtomatike, kibernetike, računalništva, elektronike, informatike, inženirstva, umetne inteligence, teorije sistemov, itd.), ki skupaj zagotavljajo funkcionalnost, zanesljivost, varnost in učinkovitost delovanja naprav, strojev tehnoloških linij, procesov in sistemov. Zato so tehnologije vodenja **ključna infrastrukturna omogočivna tehnologija**, ki nastopa kot **integrator** vseh tehnologij, potrebnih pri zasnovi in izvedbi novega izdelka/sistema. Gre torej za tipično horizontalno tehnologijo, ki svojo uporabo najde na zelo različnih področjih družbenega razvoja, med katerimi izstopa uporabnost tehnologij vodenja pri razvoju gradnikov, orodij in sistemov za tovarne prihodnosti.

Glede na izkazane kompetence, kapacitete in interes industrijskih partnerjev, je poudarek razvojnih raziskav namenjen:

- zasnovi novih gradnikov, ki bodo prispevali k močnejši integraciji fizikalnega in digitalnega sveta v tovarnah prihodnosti,
- razvoju novih postopkov, ki zagotavljajo samodejno vsestransko in globinsko analizo kakovosti izdelkov (z namenom zagotavljanja 100% kakovosti izdelkov),
- razvoju novih postopkov za sprotno ocenjevanje stanja/kondicije strojev in naprav (PHM- Prognostics & Health Management),
- razvoju novih zmogljivih orodij za rudarjenje informacij v proizvodnih podatkih (s pomočjo matematičnih modelov).

Rezultate razvojnih aktivnosti bomo uporabili predvsem okviru fokusnih področij »Inteligentni sistemi vodenja za tovarne prihodnosti« in »Pametna tovarna«, pa tudi v drugih fokusnih področjih, ki so vključena v SRIPTOP.

Control technologies represent fusion of various professional fields (automation, cybernetics, computer science, electronics, informatics, engineering, artificial intelligence, system theory, etc.), which together provide functionality, reliability, safety and efficiency of operation of machines, technological lines, processes and systems. Therefore, control technologies are **a key infrastructural enabling technology**, which acts as an **integrator** of all the technologies needed to design and implement a new product/system. It therefore represents a typical horizontal technology that finds its usability in very different areas of social development, among which stands out the applicability of control technologies in the design and development of building blocks, tools and systems for Factories of the Future. Based on the competences, capacities and interest of industrial partners, the focus of applicative research is towards

- design of new building blocks, which will contribute to stronger integration of the physical and digital world in factories of the future,
- development of new procedures that ensure an automatic, comprehensive and deep analysis of product quality (with the aim of providing 100% quality of final products),
- development of new procedures for the ongoing assessment of the state/condition of machines and devices (PHM-Prognostics & Health Management),
- developing new powerful tools for mining information in production data (using mathematical models).

The results of the development activities will be used primarily in the framework of the focus areas "Intelligent Control Systems for the Future Factories" and "Smart Factory" as well as in other focus areas that are included in the SRIPTOP.



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Diagram različnih stanj proizvodnega sistema, ki je bil avtomatsko zgrajen iz multivariatnih senzorskih podatkov z orodjem StreamStory za analizo in raziskovanje podatkov.
A diagram of the different states of a manufacturing system automatically constructed from multivariate sensor data by the StreamStory data analysis and exploration tool.



Odsek za umetno inteligenco (www.ailab.ijs.si) s približno 40 raziskovalci, je eden izmed največjih evropskih raziskovalnih skupin na področju strojnega učenja, rudarjenja podatkov in drugih tehnologij, ki temeljijo na metodah in tehnologijah umetne inteligence. Najpomembnejša področja raziskav in razvoja so: analiza podatkov s poudarkom na tekstovnih, spletnih, večpredstavnih in dinamičnih podatkih, tehnike za analizo velikih količin podatkov v realnem času, strojno učenje, analize in modeliranje velikih omrežij, vizualizacija kompleksnih podatkov, semantične tehnologije, jezikovne tehnologije, metode sklepanja ter širše področje raziskav upravljanja z znanjem. Poleg objav raziskovalnih rezultatov so sodelavci razvili vrsto metod in orodij za čezmodalno analizo podatkov.

Mednarodni raziskovalni center za umetno inteligenco« pod okriljem UNESCO (www.ircai.org), pred kratkim ustanovljen na IJS, je prvi mednarodni raziskovalni center na področju umetne inteligence. IRCAI trenutno zaposluje 12 raziskovalcev, ki so spomladi 2020 vzpostavili orodje Coronaviruswatch.ircai.si. Orodje v realnem času sledi objavam o virusu, posodablja pa tudi podatke o širjenju virusa po svetu.

Department for Artificial Intelligence (<http://ailab.ijs.si>), with approx. 40 researchers, is one of the largest European research groups working in the areas of machine learning, data mining, language technologies, semantic technologies and sensor networks. The key research direction is combining modern statistical data analytic techniques with more semantic/logic-based knowledge representations and reasoning techniques with the purpose to progress in solving complex problems such as text understanding, large scale probabilistic reasoning, building broad coverage knowledge bases, and dealing with scale.

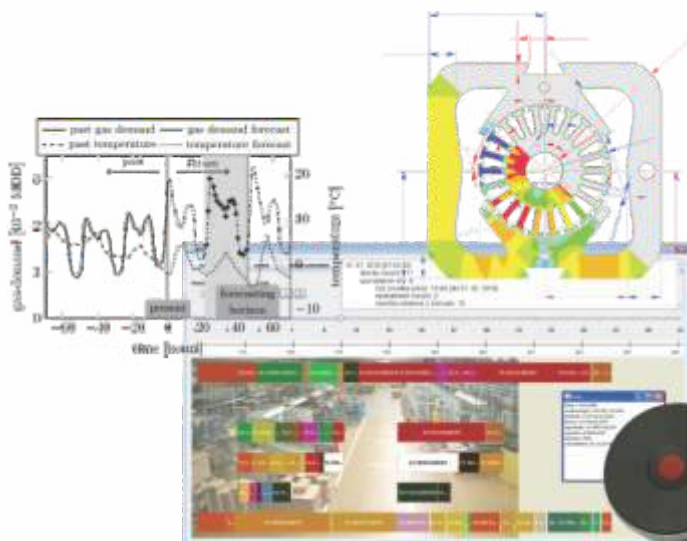
International Research Center on Artificial Intelligence under auspices of UNESCO (<http://ircai.org>) is the first UNESCO International Research Center on AI that has been recently established at JSI. IRCAI currently has 12 researchers that address global challenges related to AI. One of the first services developed by IRCAI is Coronaviruswatch.ircai.si.

IJS, Odsek Računalniški sistemi - E7



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Rešitve s področja napovedovanja porabe, optimizacije načrtovanja, planiranja in razvrščanja v proizvodnji, ...

The Jožef Stefan Institute is a research organization for basic and applied research in natural sciences and technology. It plays the role of a national research institute, complementing the role of the universities and bridging the gap between science and industry.

The Computer Systems department is concerned primarily with the development of advanced computing structures and efficient algorithms for massive-data processing, and systems for effective human-computer interaction. Within this broad area, we are concentrating on self-reparable and self-adapting systems, modelling and optimizing of complex, dynamic and nondeterministic systems.

Our research results are implemented within applications for production, transport, energy, bioinformatics, health, and medicine. Members of the department have close contacts and collaborations with scientists worldwide, through academic links and industrial contacts, thus enabling us to keep at the forefront of rapidly developing fields.

We participate in several international project consortia within the programmes of FP7, H2020, and ECSEL / ARTEMIS JU as well as in national industrial projects.

PRODUCTS & SERVICES:

Applications (desktop, mobile) and services for:

- multi-objective optimization of complex and dynamic systems (uncertainties),
- reconfigurable / adaptive software and hardware structures,
- digital twins.

Inštitut »Jožef Stefan« je raziskovalna organizacija za temeljne in aplikativne raziskave v naravoslovju in tehnologiji. Ima vlogo nacionalnega raziskovalnega inštituta in dopolnjuje vlogo univerz ter premošča vrzel med znanostjo in industrijo.

Osnovne raziskave **Odseka za računalniške sisteme** obsegajo razvoj naprednih računalniških struktur, zmogljivih algoritmov za obdelavo velikih količin podatkov ter sistemov za učinkovito interakcijo med človekom in računalnikom. Pozornost namenjamo samopopravljivim in samonastavljivim sistemom, modeliranju in optimiranju kompleksnih, dinamičnih in nedeterminističnih sistemov.

V okviru navedenih raziskav razvijamo aplikacije na področjih proizvodnje, transporta, energetike, bioinformatike, zdravja in medicine. Raziskovalci na odseku vzdržujejo visok nivo aktualnega znanja z raziskovalnih področij in imajo vzpostavljene povezave in sodelovanja z drugimi akademskimi institucijami in industrijo.

Sodelujemo v več mednarodnih projektih konzorcijih v okviru programov FP7, H2020 in JS ECSEL / ARTEMIS ter v nacionalnih industrijskih projektih.

PROIZVODI / STORITVE:

Aplikacije (namizne, mobilne) in servisi za:

- večkriterijske optimizacije kompleksnih in dinamičnih sistemov,
- obnovljive / prilagodljive programske in strojne strukture,
- digitalne dvojčke

Institut Jožef Stefan
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E1 - Department of Knowledge Technologies

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Zmagovalna ekipa mednarodnega izziva Mars express na obisku na Evropski vesoljski agenciji v Darmstadtu.
The winning team of the international challenge Mars Express during a visit at the European Space Agency in Darmstadt.



Področje dela **Odseka za tehnologije znanja** na Institutu Jožef Stefan je razvoj metod umetne inteligence ter naprednih informacijskih tehnologij za zajemanje in obdelavo podatkov ter odkrivanje in upravljanje znanja. Uveljavljena področja našega dela vključujejo inteligentno analizo podatkov, besedil in spleta (strojno učenje, rudarjenje podatkov, odkrivanje zakonitosti v podatkih), jezikovne tehnologije, računalniško kreativnost, podporo pri odločanju ter upravljanje znanja. Razvijamo tudi aplikacije teh tehnologij na različnih področjih znanosti in industrije. Na področju inteligentne analize in rudarjenja podatkov razvijamo nove metode predvsem na področju strojnega učenja in jih prilagajamo za uporabo v raznovrstnih aplikacijah. Aplikativno je zelo relevantno tudi naše delo na področju metod in sistemov za podporo pri odločanju, v sklopu katerega razvijamo metode in tehnike odločitvenega modeliranja ter podporna računalniška orodja, ki jih povezujemo s sistemi za rudarjenje podatkov.

Odsek je izrazito močno vključen v domače in tuje raziskovalne projekte. V letu 2018 smo bili na primer vključeni v šestnajst domačih raziskovalnih projektov, deset EU projektov Obzorja 2020, eno EU COST akcijo, en INTERREG V-A Slovenija-Italija, en projekt pametne specializacije in dva tržna projekta za zunanje naročnike.

Mednarodno konkurenčnost Odseka za tehnologije znanja na področju razvoja in uporabe metod umetne inteligence, predvsem strojnega učenja na zahtevnih aplikativnih problemih, potrjujejo tudi dosežki, kakršen je bila naprimer zmaga na mednarodnem izzivu Evropske vesoljske agencije Mars express

(<https://www.rtvsl.si/stevilke/znanost/bernard-zenko-mars-express-je-ze-upravil-nalozbo/410118>).

The Department of Knowledge Technologies of the Jožef Stefan Institute is involved in the development of artificial intelligence methods and advanced information technologies aimed at acquiring and storing data and managing knowledge.

Established areas of our work include intelligent data analysis (machine learning, data mining, and knowledge discovery in databases), language technologies, computational creativity, decision support and knowledge management. We are applying these technologies in various fields of science and industry. In the field of intelligent analysis and data mining, we are developing new methods, especially in the field of machine learning, and are adapting them for use in a variety of applications. Applied work is also very relevant in the area of decision support methods and systems, in the scope of which we develop methods and techniques for decision modeling and the supportive computer tools, which are often connected with data mining systems.

The department is strongly involved in national and international research projects. In 2018, for example, we were involved in sixteen national research projects, ten EU projects of Horizon 2020, one EU COST action, one INTERREG V-A Slovenia-Italy, one smart specialization project and two commercial projects.

International competitiveness of the Department of Knowledge Technologies in the field of development and application of artificial intelligence methods, especially machine learning on demanding application problems, is confirmed also by achievements such as winning in the international challenge of the European Space Agency Mars Express

(<https://www.rtvsl.si/stevilke/znanost/bernard-zenko-mars-express-je-ze-upravil-nalozbo/410118>).

IJS, Odsek za fiziko nizkih in srednjih energij - F2



analiza sestave antične posode, Institut Jožef Stefan, fotografija: Arne Hodalič in Katja Bidovec
analysis of the composition of the ancient vessel, Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

Institut Jožef Stefan
F2 - Odsek za fiziko nizkih in srednjih energij
Jožef Stefan Institute

F2 - Department of Low and Medium Energy Physics
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Odsek za fiziko nizkih in srednjih energij izvaja osnovne raziskave na področju jedrske in atomske fizike. Pridobljeno znanje uporablja pri reševanju interdisciplinarnih raziskovalnih problemov, kot so radiološki nadzor okolja, raziskave materialov, biologija, medicina, shranjevanje energije, farmacija, okolje in arheometrija. Poglavitno orodje, ki nam omogoča vrhunsko delo, je 2MV ionski pospeševalnik, lociran v reaktorskem centru v Podgorici. Pospeševalnik ima štiri žarkovne linije, te omogočajo različne raziskave v atomski in jedrski fiziki, kjer smo močno vpeti v evropske raziskovalne projekte. Poleg dela na pospeševalniku izvajamo raziskave z detektorji ionizirajočega sevanja ter eksperimentalnimi napravami za atomsko fiziko in kalibrirana sevalna polja. Sodelavci odseka tudi pogosto gostujejo na veliki eksperimentalni infrastrukturi v tujini. Pri reševanju aplikativnih problemov naše delo sega od rutinskega nadzora radioaktivnosti pitne vode na eni strani do razvoja detektorskih sistemov za mednarodni jedrski raziskovalni center FAIR v Darmstadt na drugi. Široka paleta znanj sodelavcev odseka zagotavlja kvalitetne storitve na najvišjem nivoju.

PROIZVODI / STORITVE:

- analize elementne in izotopske sestave snovi,
- feromagnetizem v keramiki,
- kemijsko slikanje bioloških materialov,
- meritve radioaktivnosti, dozimetrija,
- elektrokemijski procesi v baterijah,
- izdelava mehanskih mikrostruktur s protonskim žarkom,
- razvoj detektorskih sistemov.

The **Department of Low and Medium Energy Physics** carries out basic research in the field of nuclear and atomic physics. It also uses acquired knowledge in solving interdisciplinary research problems, such as radiological control of the environment, material research, biology, medicine, energy storage, pharmacy, environment and archeometry. The 2MV ion accelerator, located in the reactor center in Podgorica, is our main tool. The accelerator has four beam lines, which enable various research in atomic and nuclear physics, where we are strongly involved in European research projects. In addition to the accelerator related work, we conduct research with ionizing radiation detectors and experimental devices for atomic physics and calibrated radiation fields. Colleagues often host on a large experimental infrastructure abroad as well. In solving application problems, our work ranges from routine monitoring of radioactivity of drinking water to the development of detector systems for the FAIR International Nuclear Research Center in Darmstadt. A wide range of researchers' knowledge and experience provides quality services at the highest level.

PRODUCTS & SERVICES:

- analysis of the elemental and isotopic composition of the matter,
- ferromagnetism in ceramics,
- chemical imaging of biological materials,
- radioactivity measurements, dosimetry,
- electrochemical processes in batteries,
- production of mechanical microstructures with proton beam,
- development of detector systems.

IJS, Odsek za tanke plasti in površine - F3

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Kolekcija rezalnih in preoblikovalnih orodij, prekritih z različnimi trdimi prevlekami
A collection of cutting and forming tools protected by various hard coatings



Odsek za tanke plasti in površine je eden izmed 28 raziskovalnih odsekov Instituta Jožef Stefan.

Ožje raziskovalno področje obsega trde zaščitne prevleke; to so tanke plasti zelo trdih materialov, debele le nekaj mikrometrov, ki se uporabljajo za zaščito orodij pred obrabo.

Pokrivamo celotno verigo dejavnosti, od najbolj elementarnih (fizika plazme, mehanizmi rasti tankih plasti), preko aplikativnih (razvoj prevlek, analitika njihovih lastnosti) do implementacije teh prevlek v industrijsko proizvodnjo.

V okviru odseka deluje tudi Center za trde prevleke (lociran je v Domžalah), kjer nanašamo trde prevleke na orodja za naše industrijske partnerje.

PROIZVODI / STORITVE:

- nanašanje trdih zaščitnih prevlek na orodja (za tehnične detajle se obrnite na odsek),
- nanašanje kovinskih tankih plasti na manjše vzorce,
- svetovanje pri uvajanju prevlek v proizvodnjo,
- zahtevnejša analitika površin in tankih plasti,
- ekspertize in strokovna mnenja,
- tematski strokovni seminarji.

The **Department of Thin Films and Surfaces** is one of 28 research departments of the Jožef Stefan Institute.

Our core research topic includes hard protective coatings; these are thin films made of very hard materials with a thickness of only a few micrometers, which are applied for protection of tools against wear.

We cover the complete chain of activities, starting from the most basic ones (plasma physics, thin film growth mechanisms), to applied ones (development of coatings, analytics of their properties), up to implementation of these coatings into industrial production.

Within the department there is the Hard Coating Center (located in the town of Domžale) where we deposit hard coatings on tools for our industrial partners.

PRODUCTS & SERVICES:

- deposition of hard protective coatings on tools (for technical details, ask the department staff),
- deposition of metallic thin films on small samples,
- consulting on implementation of coatings in industrial production,
- advanced analytics of surfaces and thin films,
- expertise and professional opinions,
- dedicated professional seminars.

IJS, Odsek za tehnologijo površin - F4



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Odsek za tehnologijo površin,
Laboratorij za analizo površin in tankih plasti,
Institut „Jožef Stefan“, fotografija: Arne Hodalič in Katja Bidovec
Department of surface engineering,
Laboratory for surface and thin layer analysis,
Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

Odsek za tehnologijo površin (F4) na Institutu Jožef Stefan se ukvarja z znanstvenimi in tehnološkimi izzivi pri pripravi ustreznih lastnosti površin trdnih in tekočih materialov. Za analizo površin uporablja najodobnejšo opremo, ki je pogosto edinstvena v Sloveniji. Podrobnejše aktivnosti raziskovalne skupine, ki zaposluje deset uglednih znanstvenikov in približno še enkrat toliko ostalih sodelavcev (predvsem mladih raziskovalcev) so:

- raziskave lastnosti površin in tankih plasti ter analize tovrstnih materialov z metodami XPS, AES, SIMS in AFM,
- raziskave plinskih razelektritev in plinske plazme,
- raziskave interakcije plinske plazme z organskimi in anorganskimi materiali,
- razvoj plazemskih postopkov za sintezo in modifikacijo nanomaterialov,
- raziskave interakcije plinske plazme z biološkim materialom za razvoj postopkov za uporabo plinske plazme v kmetijstvu, biotehnologiji in medicini,
- raziskave interakcije plazemskih delcev z industrijskimi vzorci in svetovanje o možnostih industrializacije znanstvenih dosežkov.

PROIZVODI/STORITVE:

Vrhunsko izobražen kader in brezhibno delujoča oprema omogočata vrhunske storitve analiz površine različnih materialov, svetovanje o primernosti uporabe plinske plazme za doseg želenih površinskih lastnosti obdelovancev in načrtovanje ustreznih plazemskih reaktorjev. Storitve prvenstveno opravljamo v okviru skupnih znanstveno-raziskovalnih projektov, možne pa so tudi klasične rutinske analize.

Department of Surface Engineering (F4) at the Jožef Stefan Institute deals with scientific and technological challenges in designing suitable surface characteristics of solid and liquid materials. State-of-the-art technology, often one-of-a-kind in Slovenia, is used for surface analysis. Detailed activities of the research group, comprised of ten eminent scientists and about as many other coworkers (primarily young researchers), are:

- characterization of surfaces and thin layers and analysis of these materials using methods such as XPS, AES, SIMS and AFM,
- gas discharge and gas plasma research,
- research of gas plasma interaction with organic and inorganic materials,
- development of plasma procedures for nanomaterial synthesis and modification,
- research of gas plasma interaction with biological materials to develop procedures utilizing gas plasma in agriculture, biotechnology and medicine,
- research of plasma particle interaction with industrial samples and consulting on the potential of applying scientific advances in industry.

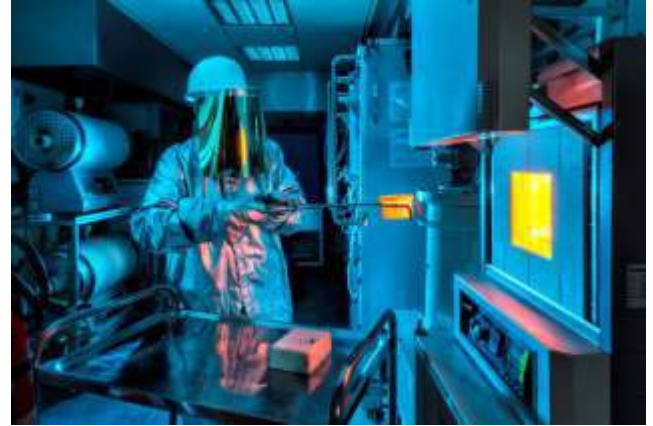
PRODUCTS&SERVICES:

With high-skilled staff and flawlessly operating equipment the department provides superior services in analyzing surfaces of different materials, consulting on using gas plasma for the attainment of desired surface characteristics of treated materials and designing suitable plasma reactors. Services are primarily performed within the framework of scientific and research programs, in addition to carrying out standard routine analyses.

IJS, Odsek za elektronsko keramiko - K5

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K5 - Odsek za elektronsko keramiko
K5 - Electronic Ceramics Department
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Procese v materialih pri visokih temperaturah raziskujemo za učinkovito načrtovanje funkcijskih lastnosti keramičnih mikroelektromehanskih sistemov.
 Institut „Jožef Stefan“, fotografija: Arne Hodalič in Katja Bidovec
We investigate processes in materials at high temperatures to tailor the functional properties of ceramic microelectromechanical systems.
 Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

Odsek za elektronsko keramiko raziskuje sintezo, lastnosti in uporabo materialov za elektroniko in energetiko, pretežno kompleksnih materialov in struktur, ki lahko opravljajo več funkcij (multifunkcijski materiali). To so predvsem keramični piezoelektriki, feroelektriki, relaksorji, multiferroiki in prevodni oksidi.

Poudarek raziskav je na kreiranju lastnosti s sintezo in strukturo na nano-, mikro- in makro nivoju. Raziskujemo tudi osnove procesov za pripravo senzorjev tlaka, keramičnih mikroelektromehanskih sistemov (MEMS) in fleksibilne elektronike.

PROIZVODI / STORITVE:

Ponujamo storitve in izobraževanja s področja:

- sinteze anorganskih materialov v trdnem stanju, mehanokemijske sinteze, sinteze iz raztopin;
- oblikovanja materialov s tehnologijami sitotiska, nalivanja, brizgalnega tiskanja, elektroforetskega nanosa, metode vrtenja;
- merjenja in kontrole lastnosti materialov in struktur od nano- do mikro-nivoja.

The Electronic Ceramics Department is active in the research of the synthesis, properties and applications of materials for electronics and energetics, mainly complex multifunctional materials and structures that can perform multiple functions (multifunctional materials). The materials of interest include ceramic piezoelectrics, ferroelectrics, relaxors, multiferroics and conductive oxides.

The emphasis is on the creation of the properties by the synthesis and structure on the nano-, micro- and macro-levels. The group also works on principles of basic technologies of ceramic pressure sensors, ceramic microelectromechanical systems (MEMS) and flexible electronics.

PRODUCTS & SERVICES:

We offer services and education in the field of:

- synthesis of inorganic materials by solid state synthesis, mechanochemical synthesis and solution synthesis;
- patterning of materials with screen printing, tape casting, inkjet printing, electrophoretic deposition, spin coating;
- measurement and control of the properties of materials and structures from nano to micro-level.

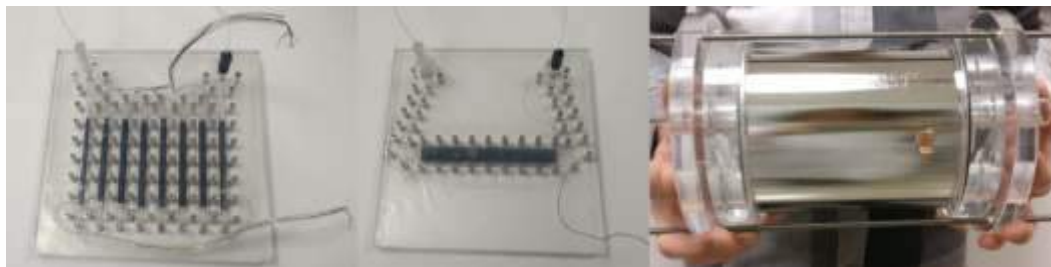
IJS, Nanostrukturni materiali - K7



**Institut
"Jožef Stefan"
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**Institut Jožef Stefan
K7 - Nanostrukturni materiali
Jožef Stefan Institute
K7 - Department for
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Fotokatalitski mikoreaktorji za podlagi anodiziranih titanatnih nanožic

Na **odseku za nanostrukturne materiale** spodbujamo rast in gospodarsko dejavnost, hkrati pa razvijamo inovacije, ki so konkretne, merljive, realistične in dosegljive.

Na odseku sodelujemo s številnimi podjetji z misijo razvoja tehnologije in končnega produkta.

- Na področju magnetnih materialov se osredotočamo na razumevanje povezave med posameznimi mikrostrukturnimi elementi in končnimi lastnostmi visokoenergijskih magnetov,
- uspešno razvijamo in izboljšujemo varistorско keramiko ter misijo razvoja keramičnih materialov nadaljujemo na področju termoelektričnih generatorjev,
- z namenom izboljšanja kakovosti življenja in ekološke ozaveščenosti razvijamo sisteme za detekcijo in razgradnjo toksičnih organskih spojin v vodi in zraku. Razvijamo senzorje za detekcijo formaldehida in akrilamida na osnovi prenosnih elektrokemijskih in uporovnih senzorjev. Za namen čiščenja in razgradnje organskih spojin smo razvili fotokatalitski TiO₂ mikoreaktor;
- v okviru aditivne proizvodnje se poglobljamo v razvoj izhodnih materialov za oblikovanje kovinskih zlitin, magnetov in keramičnih materialov.

PROIZVODI / STORITVE:

(1) Sinteza in karakterizacija magnetnih materialov za električne motorje in vetrne generatorje, (2) Razvoj in študij mikrostrukture varistorjev, (3) Fotokatalitski mikoreaktorji za čiščenje odpadnih voda in zraka, (4) Elektrokemijski in uporovni senzorji za detekcijo toksičnih organskih spojin, (5) 3D tisk kompleksnih oblik, (6) Elektronska mikroskopija.

*At the **Department for Nanostructured Materials** we stimulate growth and economic activity while developing innovations that are concrete, measurable, realistic, and achievable.*

We collaborate with companies and the mission is technology development where a product is the final goal.

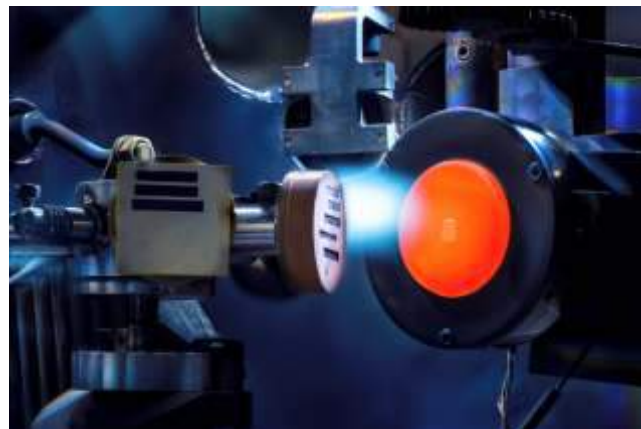
- *In the field of magnetic materials, we focus on understanding the connection between individual microstructural elements and the final properties of high energy magnets,*
- *successful development and improvement of ZnO₂ varistor ceramics and development of ceramic materials for thermoelectric generators,*
- *in order to improve the quality of living, we are developing systems for the detection and degradation of toxic organic compounds in water and air. We develop sensors for the detection of formaldehyde and acrylamide based on portable electrochemical and resistance sensors. For the purpose of purification and degradation of organic compounds, a photocatalytic TiO₂ microreactor has been developed;*
- *in the field of advanced additive manufacturing processes, we are focusing on the development of starting materials for the design of metal alloys, magnets and ceramic materials.*

PRODUCTS & SERVICES:

(1) *Synthesis and characterization of magnetic materials for electric motors and wind generators, (2) Development and study of varistor microstructure, (3) Photocatalytic micro-reactors for the treatment of waste water and air, (4) Electrochemical and resistance sensors for the detection of toxic organic compounds, (5) 3D printing, (6) Electron microscopy.*

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Ultravijolični laser tvori plazemski plaz iz tarče, ki potuje proti segretemu substratu, kjer se delci razporedijo z atomsko natančnostjo. To omogoča epitaksialno integracijo različnih tankih plasti funkcionalnih oksidov na silicijeve podlage za napredne elektronske aplikacije. Institut „Jožef Stefan“, fotografija: Arne Hodalič in Katja Bidovec
An ultraviolet laser forms a plasma plume from a target, which travels towards the heated substrate where the particles arrange themselves with atomic precision. This enables various functional oxide thin films to be integrated in the epitaxial form with silicon substrates for advanced electronic applications. Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

Na **Odseku za raziskave sodobnih materialov** razvijamo nove materiale s poznavanjem soodvisnosti njihovih strukturnih, mikrostrukturnih in funkcionalnih lastnosti. Pri tem uporabljamo napredne tehnologije, ki omogočajo kontrolo sinteze na atomskem in mikrostrukturnem nivoju. Z njimi pripravljamo vnaprej načrtovane strukturirane 3D-materiale, tanke plasti in nanodelce z izbrano kristalno strukturo, kemijsko sestavo in mikrostrukturno.

Med našimi pomembnejšimi cilji je razvoj i) novih funkcionalnih oksidnih materialov za elektronske aplikacije, ii) naprednih funkcionalnih materialov, iii) novih biokompatibilnih materialov z izboljšanimi antibakterijskimi ali piezoelektričnimi lastnostmi in iv) toplotnoizolacijskih materialov z zboljšanimi lastnostmi in trajnostnim vidikom. Dodatno pozornost pa posvečamo tudi karakterizaciji električnih lastnosti materialov.

EKSPERTIZE

R&R:

- volumenske keramike in tankih plasti,
- nanodelcev funkcionalnih oksidov z definirano obliko,
- materialov za komponente, kot so keramični kondenzatorji, piezoakuatorji, mikrovalovne naprave, itd.,
- samočistilnih in antibakterijskih premazov za belo tehniko in gradbeništvo,
- biomaterialov za regeneracijo tkiva in regenerativno medicino,
- mineralnih vlaken za zvočno in toplotno izolacijo,
- trajnostnih toplotno-izolacijskih materialov in postopkov njihove priprave po principih krožnega gospodarstva.

At the **Advanced Materials Department** we investigate novel materials through an understanding of the mutual dependence of their structural, microstructural and functional characteristics. Modern technologies that enable the synthesis of materials with atomic- and microscale precision are used to prepare pre-designed structural 3D materials, thin films and nanoparticles with the desired crystal structure, chemical composition, microstructure and morphology.

Among our important objectives is the development of i) novel functional oxides for electronic applications, ii) novel functional materials, iii) antibacterial and piezoelectric biocompatible materials and vi) heat-insulation materials with improved properties and sustainability.

EXPERTISE

R&D of:

- bulk ceramics and thin films,
- defined-shape functional oxide (nano)particles,
- materials for components, such as capacitors, piezoactuators, microwave devices etc.,
- self-cleaning and antibacterial coatings for household appliances and civil engineering,
- biomaterials for tissue engineering and regenerative medicine,
- mineral fibres for sound and thermal insulation,
- sustainable thermal insulation materials and processes for their preparation, circular economy principles.

IJS, Odsek za znanost o okolju - O2



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Iskanja z navdihom 1949-2019, Institut „Jožef Stefan“, fotografija: Arne Hodalič in Katja Bidovec
Inspired Searching 1949-2019, Jožef Stefan Institute, photo: Arne Hodalič and Katja Bidovec

Multidisciplinarne raziskave **Oddelka za znanosti o okolju** se osredotočajo na kombinacijo fizičnih, kemičnih in bioloških procesov, ki vplivajo na okolje, človeka in človekove dejavnosti. Zato delo temelji na treh glavnih področjih:

- razvoju, optimizaciji in potrjevanju analitičnih metod,
- proučevanju geokemičnih procesov, ki vplivajo na cikličnost in preoblikovanje snovi in elementov,
- presoji vplivov na okolje, ki ocenjuje tveganje, ki ga človekove dejavnosti predstavljajo za zdravje ljudi in za okolje.

V okviru odseka delujeta tudi dva infrastrukturna centra: Center za masno spektrometrijo in Center za radon, del odseka pa je tudi Ekološki laboratorij z mobilno enoto.

Odsek sodeluje pri številnih nacionalnih in mednarodnih raziskovalnih projektih ter neposredno z naročniki uporabnih raziskav. Da lahko sledimo razvoju znanosti, mnogo truda vlagamo v razvoj znanja in posodabljanje raziskovalne opreme.

Pomemben del temeljnih in aplikativnih raziskav odseka izvaja Center odličnosti Okoljske tehnologije, delno financiran s strani EU v okviru strukturnih skladov, ki povezuje znanstveno odličnost centra z industrijo.

V centru izvajamo naslednje storitve:

organsko analizo, multielementarno analizo, specifikacijo elementov, analize živega srebra, analize radionuklidov, stabilne analize izotopov svetlobnih elementov (H, C, N, O, S), analize "netradicionalnih" stabilnih izotopov, bioanalitiko, analizo in meritve nano aerosolov, ter pro bono svetovanje.

*The multidisciplinary research of the **Department of Environmental Sciences** focuses on the combination of physical, chemical and biological processes that influence the environment, man and human activities. Therefore, the work is based on three main areas:*

- *development, optimisation and validation of analytical methods,*
- *study of geochemical processes that influence cycling and transformations of substances and elements,*
- *environmental impact assessment which evaluates the risk that human activities present for human health and for the environment.*

Within the Department there are also two infrastructural centres: the Centre for Mass Spectrometry and the Centre for Radon, as well as the Ecological Laboratory with a mobile unit.

The Department is involved in a number of national and international research projects and directly with the users of applied research. In order to stay abreast of the constant advances in science, much effort is put into development of knowledge and modernisation of scientific equipment.

A significant part of the basic and applied research of the Department is performed by the Environmental Technologies Centre of Excellence, partially funded by the EU Structural Funds, which connects the scientific excellence of the Centre with industry.

The Centre provides the following services: organic analysis, multi-element analysis, element specification, mercury analysis, radionuclide analysis, stable isotope analysis of light elements (H, C, N, O, S), "non-traditional" stable isotope analysis, bioanalytics, and nano aerosol measurements, and pro bono consulting.