

InnoRenew CoE research laboratories and equipment



InnoRenew CoE
Livade 6a
6310 Izola,
Slovenia

InnoRenew CoE building, research laboratories and equipment

In the year 2022 the InnoRenew CoE celebrated the grand opening of its new building in Izola. They also concluded with the investment in the research equipment, funded mainly by the Ministry of Education, Science and Sport from the European Regional Development Fund. The research equipment is used in nine institute's research laboratories.



Acoustic Laboratory

We are well equipped for acoustic measurements in the field of architectural and building acoustics, noise control and dynamic characterization of structures (vibrations). For this wide range of measurements, we have state-of-the-art equipment, including acoustic cameras for measuring sound intensity and localizing noise sources. In addition, software solutions enable various acoustic simulations.

A part of the laboratory is the anechoic chamber with highly absorbing inner surfaces. In the chamber it is possible to characterize the frequency and directional properties of sound sources and to study the sound reflection from surfaces. In addition, the Ambisonics system is installed in the chamber, which realistically reproduces different acoustic environments and makes it possible to study the perceptual preferences for sound.

Another part of the laboratory is the reverberation chamber, whose long acoustic response allows measurements under the diffuse sound field assumption. In the chamber, the sound absorption coefficients of materials and the sound power levels of noise sources can be determined according to the standardized measurement procedures.



Photo: Miran Kambič

InnoRenew CoE building in Izola

Photos: Miran Kambič



Advanced Manufacturing and Digital Transformation Laboratory

The Advanced Manufacturing laboratory is a technological hub providing scientific support for a broad range of bio-based businesses as they adapt to Industry 4.0 and beyond. The research staff and equipment provide a unique foundation for the development of prototype software and hardware solutions that solve technical and theoretical problems associated with digital transformation. It includes digitalization of processes and quality-driven value chains as well as production engineering, modelling of complex systems and their optimization. The mechatronic development facility supports prototyping scanning systems for in-line characterization of biomaterials, as well as CNC additive/extractive manufacturing solutions adopted for bio-based technologies. A comprehensive set of hardware components allows rapid prototyping and demonstration for next generation automation of production processes including flexible collaborative robotics.

Photos: Miran Kambič



Characterization Laboratory

The Characterization Laboratory offers complex, multiscale characterization of bio-based materials. State-of-the-art instrumentation is available for acquiring spatial, chemical, and time domain information through routine materials characterization and customized methods. This laboratory has preparation tools to pre-process materials for measurement and can perform solvent, distillation, pressing, and sublimation methods of extraction. Target compounds can be separated by flash and column chromatography, solvent evaporation or filtration, freeze-drying or heating, and ultrasonic treatments. This lab has instruments for comprehensive characterization of bioactive compounds and flash preparative and purification chromatography for challenging applications. Semi- or nondestructive techniques allow for characterization of hygroscopic properties, contact angle, surface tension, chemical composition, thermal stability, roughness, and color. Spectroscopic equipment is available for measurement and performance evaluation of materials, both in lab and in situ. Software for advanced data mining and development of chemometric models can be used for prediction of materials properties.



Photos: Miran Kambič



Composites Laboratory

The Composites Laboratory is fully equipped for the preparation of bio-based composite materials. This laboratory has the capacity to produce composites via compression and thermo-hydro-mechanical treatments. Polymer blends and composites can also be manufactured through injection molding. In addition to conventional composite preparation, this laboratory contains state-of-the-art equipment that can produce thermochemically modified materials via torrefaction and carbonization, new adhesive formulations, and impregnated materials and composites. The Composites Laboratory also houses equipment for drying and conditioning as well as assessing fundamental bio-based material properties, including moisture content, density, weight, and other dimensions.

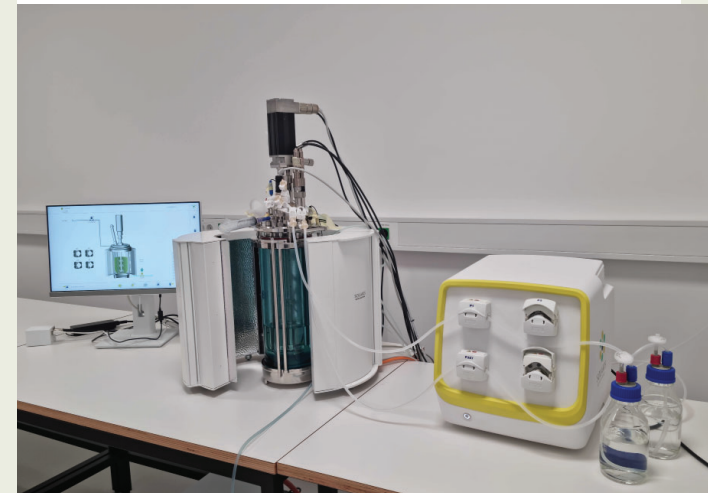
Photos: Miran Kambič



Engineered Living Materials Laboratory

Engineered Living Materials Laboratory implements biomimetic principles for the development of new materials and modification processes. It allows fabrication and characterization of “smart”, active, or multifunctional materials composed either entirely, or partly, of living cells. The laboratory is equipped with various growth chambers, which makes it possible to control microbial growth. An automated colony counter allows high throughput analysis of microbial colonies including differentiation by colour, size, and shape. The microplate reader can be used for cellular proliferation assays in fluorescence, luminescence, and UV-Vis. The stirred jacketed photobioreactor is suitable for growth of phototrophic organisms. It has a fully removable light module, which allows it to be used as a traditional fermenter / bioreactor.

Photos: InnoRenew CoE





Human Health Laboratory

The Human Health Laboratory can be used to conduct studies that relate building design, use, indoor environmental quality, and materials to human health, well-being, and performance at home, work, and school across demographics. This laboratory offers state-of-the-art equipment to monitor and assess psychophysiological indicators, neurological indicators, musculoskeletal performance, anthropometry, indoor environmental quality, human activity, and behavior. These aspects, in combination with mental health assessments, can be measured under specific laboratory-engineered environmental conditions and psychosocial settings to learn about human responses to stress, environmental conditions, and tasks.



Photos: Miran Kambič



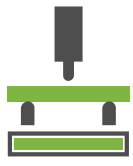
Microscopy Laboratory

The Microscopy Laboratory houses equipment for microscopic analysis of materials, composites, and products to provide insight for improved quality, performance, and identification. For proper sample preparation, this laboratory contains a Leica TXP target preparation device and a TIC 3X Ion Beam Mill. These polishing and ion milling devices can transform even the most challenging composite materials into near-perfect surfaces suitable for examination at the smallest scale by this laboratory's scanning electron microscope. The Microscopy Laboratory also contains a fluorescent microscope and a digital microscope for surface examination.



Photos: Miran Kambič



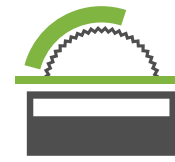


Physical Testing Laboratory



The Physical Testing Laboratory has the capacity to assess the static, dynamic, and creep behavior of elastic, plastic, and viscoelastic materials. This laboratory has both a universal test machine and a creep testing machine with precisely controlled environmental chambers that allow investigation of short- and long-term viscoelastic behavior in natural materials. This lab is also equipped with in situ testing devices to assess building performance and component properties with micro- or nondestructive methods. The Physical Testing Laboratory can measure vibration periods and damping values as well as record precise 3D point clouds that can be used for further modelling or other parameter analysis, such as deformation measurements.

Photos: Miran Kambič



Workshop and Machine Shop



Photos: Miran Kambič



Laboratory equipment of InnoRenew CoE

	Equipment	Model	Laboratory
1	Acoustic cameras	B&K: acoustic camera Type 9712 (30 mics) and sliced wheel array acoustic camera WA-1558-W (60 mics)	Acoustic
2	Ambisonics recording and reproduction system	mh acoustics: em32 Eigenmike spherical microphone array, Genelec: 8020D (64 pcs)+ 7380A HOA reproduction system	Acoustic
3	Binaural recording and reproduction system	Neuman: KU 100 dummy head; DPA 6060 binaural microphones, AKG K702 headphones (8 pcs)	Acoustic
4	Building acoustics measurement set	NTi Audio: XL2 audio and acoustic analyzer, DS3 dodecahedron speaker, TalkBox, TM3 tapping machine	Acoustic
5	Diagnostic audiometer	Interacoustics: AD226	Acoustic
6	Impedance tube	B&K: transmission loss tube kit Type 4206-T	Acoustic
7	Low noise microphone set	B&K: Type 4955 (10 pcs)	Acoustic
8	Measuring system for airflow resistance	AED: AcoustiFlow	Acoustic
9	Software for acoustic simulations and measurements	ODEON: Room Acoustics Software V15, COMSOL: Acoustic module, AMFG: EASE, SOUND FLOW, EASERA	Acoustic
10	Structural dynamics measurement set	B&K: accelerometers Type 4507 (21 pcs), modal exciter Type 4825, modal sledge hammer Type 8208 and 8206, Polytec: PDV-100 vibrometer	Acoustic
11	3D printer	Ultimaker: 3	Advanced Manufacturing and Digital Transformation
12	Collaborative robot - double arm	ABB: IRB-14000 YUMI	Advanced Manufacturing and Digital Transformation
13	Collaborative robot - single arm	ABB: CRB-15000 GOFA	Advanced Manufacturing and Digital Transformation
14	Dron	DJI MAVIC: AIR 2 (S)	Advanced Manufacturing and Digital Transformation
15	Plasma system	Roplass: RPS40+	Advanced Manufacturing and Digital Transformation
16	Thermal imaging cameras	FLIR: A70, T 1020	Advanced Manufacturing and Digital Transformation

	Equipment	Model	Laboratory
17	Differential scanning calorimeter (DSC)	Waters TA Instruments: DSC 25	Characterization
18	Dynamic vapor sorption (DVS)	Surface Measurement System: DVS Resolution	Characterization
19	Elemental Analyzer	Thermo Scientific: FlashSmart CHNS/O	Characterization
20	Flash chromatograph	BUCHI: Pure C-850 Flashprep	Characterization
21	FTIR	Thermo Fisher Scientific: Nicolet iS50	Characterization
22	FT-IR microscope	Bruker: Lumos II	Characterization
23	FT-IR-ATR Spectrometer	Bruker: Alpha II	Characterization
24	FT-NIR Spectrometer	Bruker: Optics MPA II	Characterization
25	Fume hoods	Micro+Polo: D-1800, Kambič: D-1200	Characterization
26	Gel permeation chromatograph	Malvern Panalytical: OMNISEC RESOLVE & REVEAL	Characterization
27	Laminar flow cabinets and autoclaves	DLF: 660, Kambič: D-700 P, A-21CA, Nuve: NC150	Characterization
28	Liquid Chromatography / Mass Spectrometer (LCMS)	Aglient: 6500 Q-TOF LC/MS	Characterization
29	Multi-Channel Programmable DC Power Supply	Keithley: 2230G	Characterization
30	NIR portable spectrometer	VIAVI MicroNIR: OnSite-W	Characterization
31	NIR process control spectrometer	VIAVI MicroNIR: PAT-W	Characterization
32	Particle size analyzer	Horiba Scientific: LA-960A2	Characterization
33	pH meter	Thermo Scientific: Orion Versa-Star Pro + IS-68X591206-B-VSTAR pH/LogR module	Characterization
34	Physisorption (BET)	Anton Paar: Autosorb iQ-XR-AG-AG	Characterization
35	Proximate Analyzer	Leco: TGA801	Characterization

	Equipment	Model	Laboratory
36	Thermogravimetric analyzer (TGA)	Waters TA Instruments: TGA 5500	Characterization
37	UV/VIS Spectrophotometer	METTLER TOLEDO: Spectrophotometer UV7	Characterization
38	Zetasizer	Malvern Panalytical: Zetasizer Ultra	Characterization
39	Extruder and Injection molder	Thermo Scientific™ HAAKE™: Rheomex PTW 16 OS and Minijet Pro Piston Injection Molding System	Characterization
40	Hot Press - 270T	Langzauner: Type LZT-OK-270-L	Composites
41	Hot Press - 30T	Langzauner: Type LZT-UK-30-L	Composites
42	Hydraulic testing system	Servo Hydraulic Solutions, LLC	Composites
43	Overhead bridge crane and forklift	INDENNA: SWF KRANTECHNIK, HELI: CPD18-GB2LI	Composites
44	Reactor Buechi	SCHMIZO: glass reactor	Composites
45	Reactor OptiMax	Mettler Toledo: OptiMax 1001	Composites
46	Reactor Polyclave	BUCHI: Polyclave, JULABO: control system	Composites
47	Robot IRB	ABB: IRB 6620	Composites
48	Shredder and Mills	Robust: SD-45, FRITSCH: Power Cutting Mill PULVERISETTE 19 and 25	Composites
49	Sieve shakers	Fritsch: AS450, Minor: M200	Composites
50	Tube Furnace	Nabertherm: RSRC 120-1000/13	Composites
51	TVOC, HCHO and LVDT sensors	Stock Smart TVOC and HCHO sensor, RDP 50 mm,...	Composites
52	Vacuum pressure chamber	Kambič: VP-420	Composites
53	Air sampler	Merck-Millipore: MAS-100 NT	Engineered Living Materials

	Equipment	Model	Laboratory
54	Automated colony counter	Schuett: Biotec colonyQuant HD 10	Engineered Living Materials
55	Fermenter – Photobioreactor	Solaris Lab: ELARA ST	Engineered Living Materials
56	Growth chambers with light and humidity control	Binder: KBWF 240, KBW 240	Engineered Living Materials
57	Microbiological safety cabinet	Monmouth Scientific Guardian: MSC1200 Class II	Engineered Living Materials
58	Microplate reader	Agilent: BioTek Synergy H1	Engineered Living Materials
59	Mixer mill	Retsch: MM 400	Engineered Living Materials
60	Ultralow temperature freezer	Binder: UF V 500	Engineered Living Materials
61	High performance servers	Supermicro: x11 DPH-T826BE1CSTORAGE-1959	High-performance computing
62	High-performance computers	Mega: 9000 x Z590,...	High-performance computing
63	3D piezoelectric force plates	KISTLER: Multicomponent Force Plate Type 9287C (two 900x600 mm plates)	Human health
64	Activity monitoring system	PAL: Technologies ActivPal4 Micro	Human health
65	Cloud platform for education, promotion, and motivation in the field of ergonomics	Version 2020	Human health
66	Handheld spectrometer of illuminance	Gossen Mavospec Base	Human health
67	Isometric bilateral knee dynamometer	S2P: Science to Practice	Human health
68	Multi-function devices for measuring environmental variables in the built environment	Ahlborn: B&K Precision and Almemo noise doimeters	Human health
69	Particle counter with built-in camera	Extech: VPC300	Human health

	Equipment	Model	Laboratory
70	Psychophysiological Assessment Kit	Biopac Systems	Human health
71	System for movement analysis and functional assessment	MicroGate: OptoJump Next	Human health
72	Tool for assessment and diagnostic of spine with software	IDIAG: M360	Human health
73	3D digital microscope	Keyence: VHX-6000	Microscopy
74	Contact angle meter	Attension Theta Flex: Auto 4 equipped with 3D Topography Module	Microscopy
75	Fluorescent bioscope	Thermo Fisher Scientific: EVOS M7000	Microscopy
76	Gas Chromatography / Mass Spectrometer (GCMS)	Agilent: 5977B GC/MSD - Gerstel MPS roboticsXL	Microscopy
77	Ion Beam Mill	Leica: EM TIC 3X Triple Ion Beam Milling System with Cross sectioning holder kit	Microscopy
78	Macroscope	LEICA: DM 2700 M	Microscopy
79	Metrology microscope	LEICA: DCM8, 3D optical surface microscope	Microscopy
80	Microtome	WSL: Serie nr.8078 Schenkung Dapples	Microscopy
81	Pycnometer	AccuPyc: II 1345	Microscopy
82	Rotary Microtome	LEICA: RM2125 RTS	Microscopy
83	Sample preparation surfacing mill	LEICA: EM TXP target surfacing system	Microscopy
84	Ultrasonicators	Hielscher ultrasonic processor: UP400St, Elmasonic: S 30H	Microscopy
85	Viscometer	Anton Paar: ViscoQC 300 - L	Microscopy
86	3D laser scanner	Trimble: X7	Physical testing
87	Digital Image Correlation (DIC)	GOM: Aramis 12 MP	Physical testing
88	LCR meter and multimeters	B&K: Precision Bench LCR Meter Model 895, Keithley: DMM7510 ½ Digit Multimeter	Physical testing

	Equipment	Model	Laboratory
89	Long stroke shaker with linear ball bearings	APS: 400 ELECTRO-SEIS	Physical testing
90	Planetary Ball Mill	FRITSCH: Planetary Mill PULVERISETTE 5 premium line	Physical testing
91	Resistograph	IML: RESI PowerDrill	Physical testing
92	Screw Withdrawal	Fakopp	Physical testing
93	Thermal diffusivity/conductivity analyser	Waters TA Instruments: DTC-300	Physical testing
94	Thermal diffusivity/conductivity analyser for low conductivity	Waters TA Instruments: FOX-314	Physical testing
95	Universal testing machines	Zwick/Roell: UTM Z100TEW	Physical testing
96	Walk in and different climatic and radiation chambers	Kambič: KK-25000 CH, KK-1000 CHLT,... Opsytec: BS-03 UV/VIS,...	Workshop and Machine Shop
97	Bandsaw	SCM: S600	Workshop and Machine Shop
98	Beltsanders	SCM: SD 60 RCS (1100mm), JET: 16-32 Plus, VOLPATO: LBK - 150	Workshop and Machine Shop
99	Format and different circular saws	SCM: Si5 Linvincibile, SC2c,...	Workshop and Machine Shop
100	Horizontal and vertical mortisers	SCM: AS16, BOSCH: PBD 40	Workshop and Machine Shop
101	Lathe and universal turner / router	SCM: T124 (C.E.), ELMAG: Superturn 700/140 - Vario	Workshop and Machine Shop
102	Planner (joiner)	SCM: F520 CLASS	Workshop and Machine Shop
103	Spindle-Moulder	SCM: TI 105 NOVA	Workshop and Machine Shop
104	Thicknesser	SCM: S630 CLASS	Workshop and Machine Shop

Contact:
InnoRenew CoE
Livade 6a
6310 Izola, Slovenia

T: +386 (0)40 282 944
E: coe@innorenew.eu

www.innorenew.eu



EVROPSKA UNIJA
EVROPSKI SKLAD ZA
REGIONALNI RAZVOJ

