



Polymers are close to our hearts

# CENTRE OF POLYMER SYSTEMS

August 2022



Tomas Bata University in Zlín  
Centre of Polymer Systems



# CPS STRUCTURE RESEARCH DIRECTIONS



**Polymers Processing**



**Rubber Technologies**



**Biomaterials**



**Nanomaterials and  
Advanced technologies**



**Environmental  
Technologies**



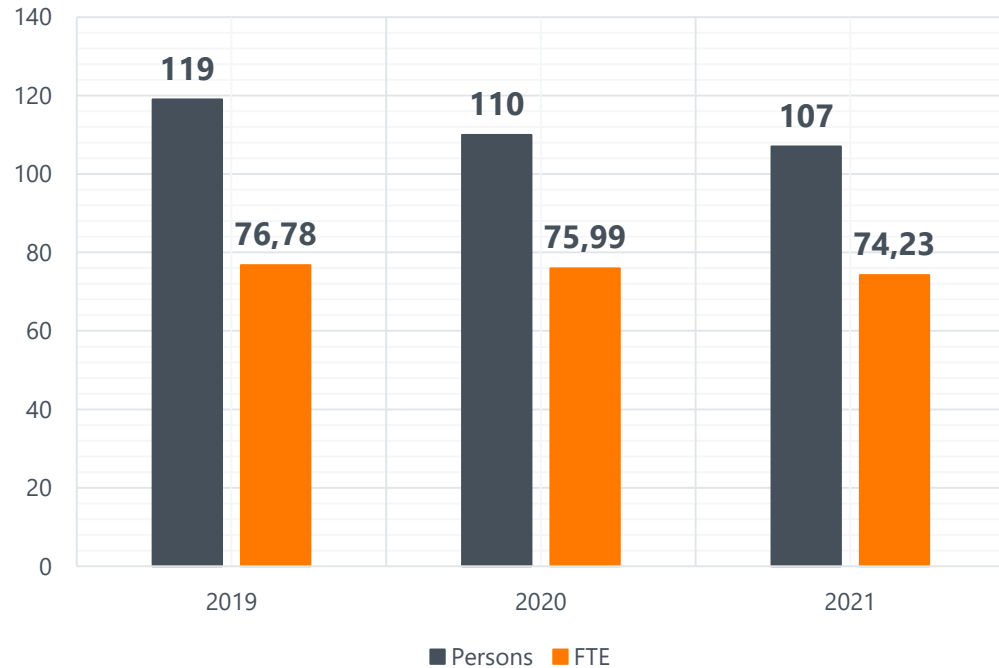
**Energy and Composite  
Materials and Devices**



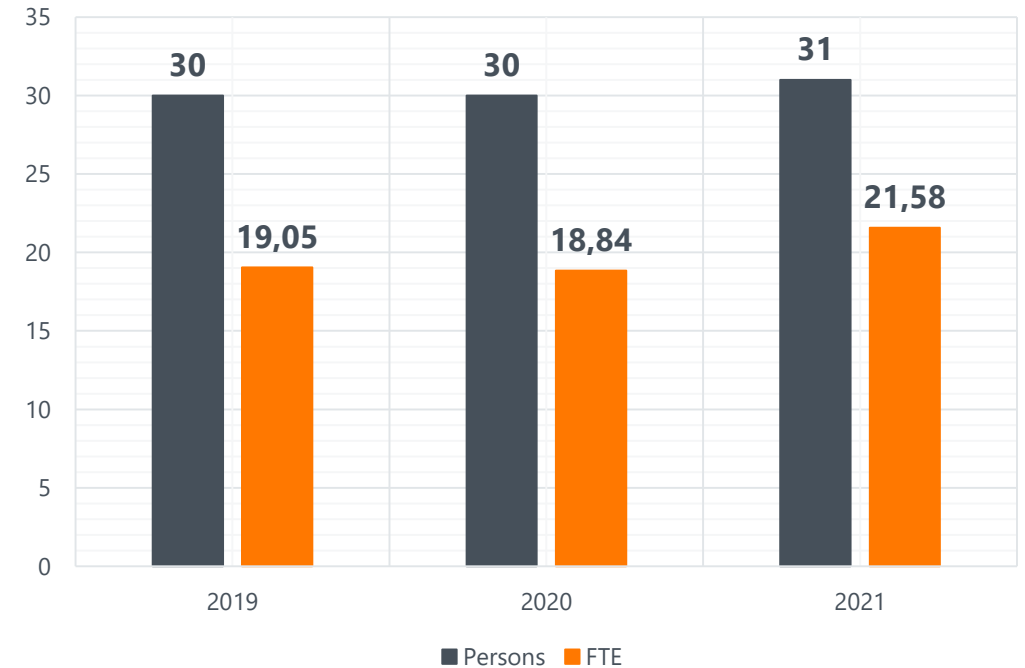
# CPS STAFF 2019 – 2021

	2019	2020	2021
Total number of employees	<b>149</b>	<b>140</b>	<b>138</b>
Total number of FTEs	<b>95.8</b> (0.64 per employee)	<b>94.8</b> (0.68 per employee)	<b>95.8</b> (0.69 per employee)

## Researchers



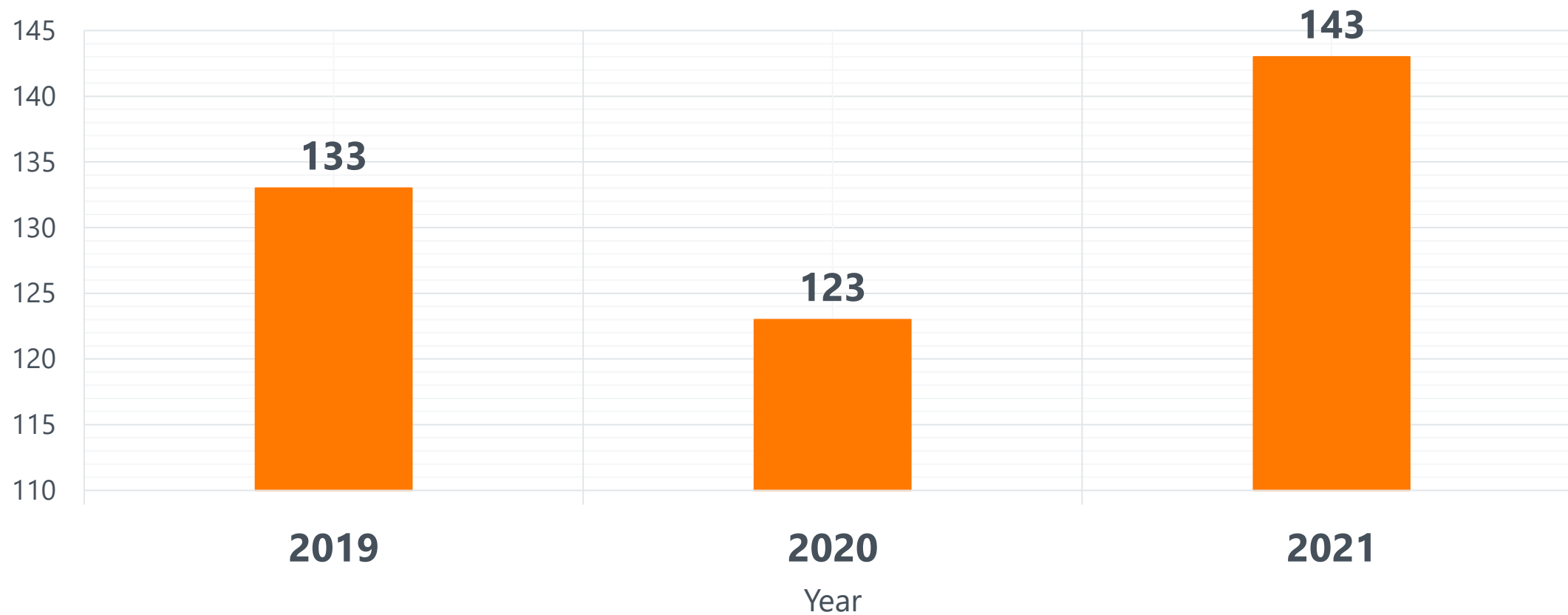
## Office & Engineers





# TOTAL COSTS 2019 – 2021

■ m CZK



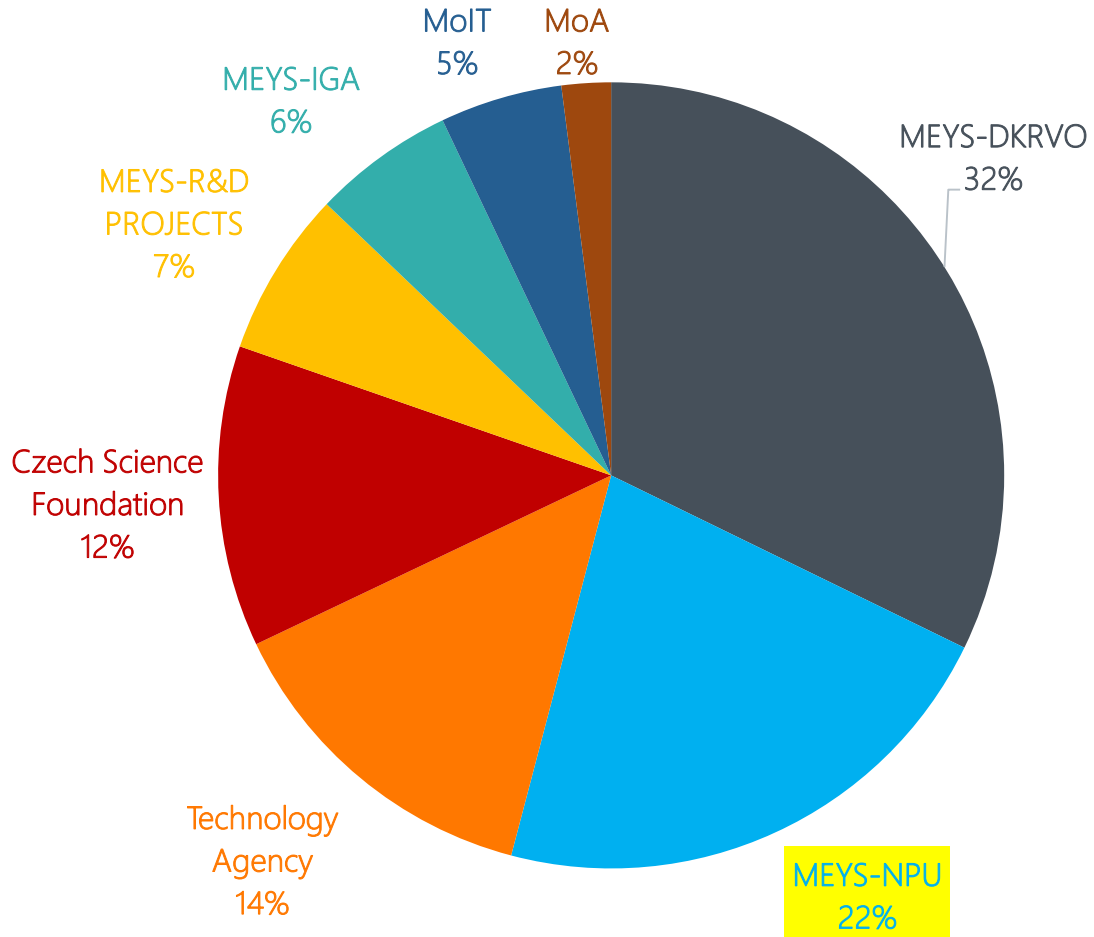
# **RESEARCH & DEVELOPMENT**



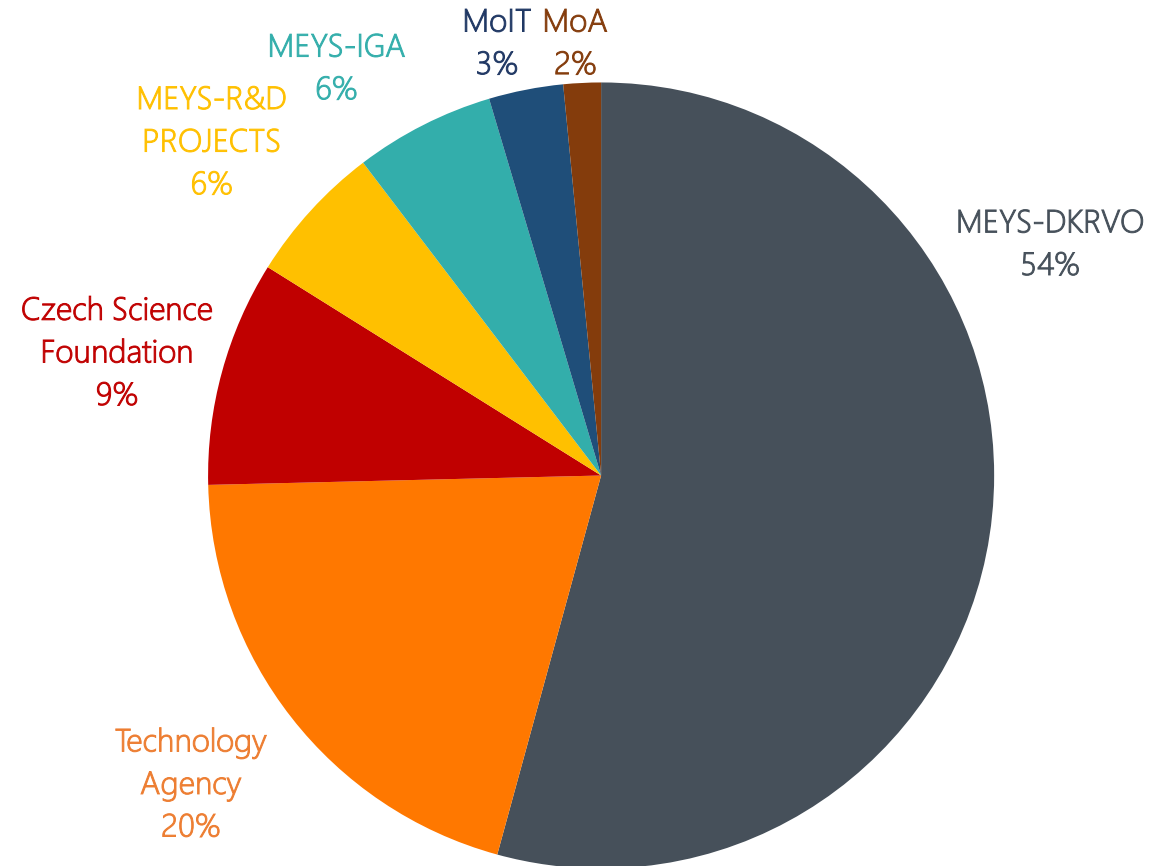
# R&D PROJECTS IN 2020-2021\*

## FUNDS ALLOCATED

2020



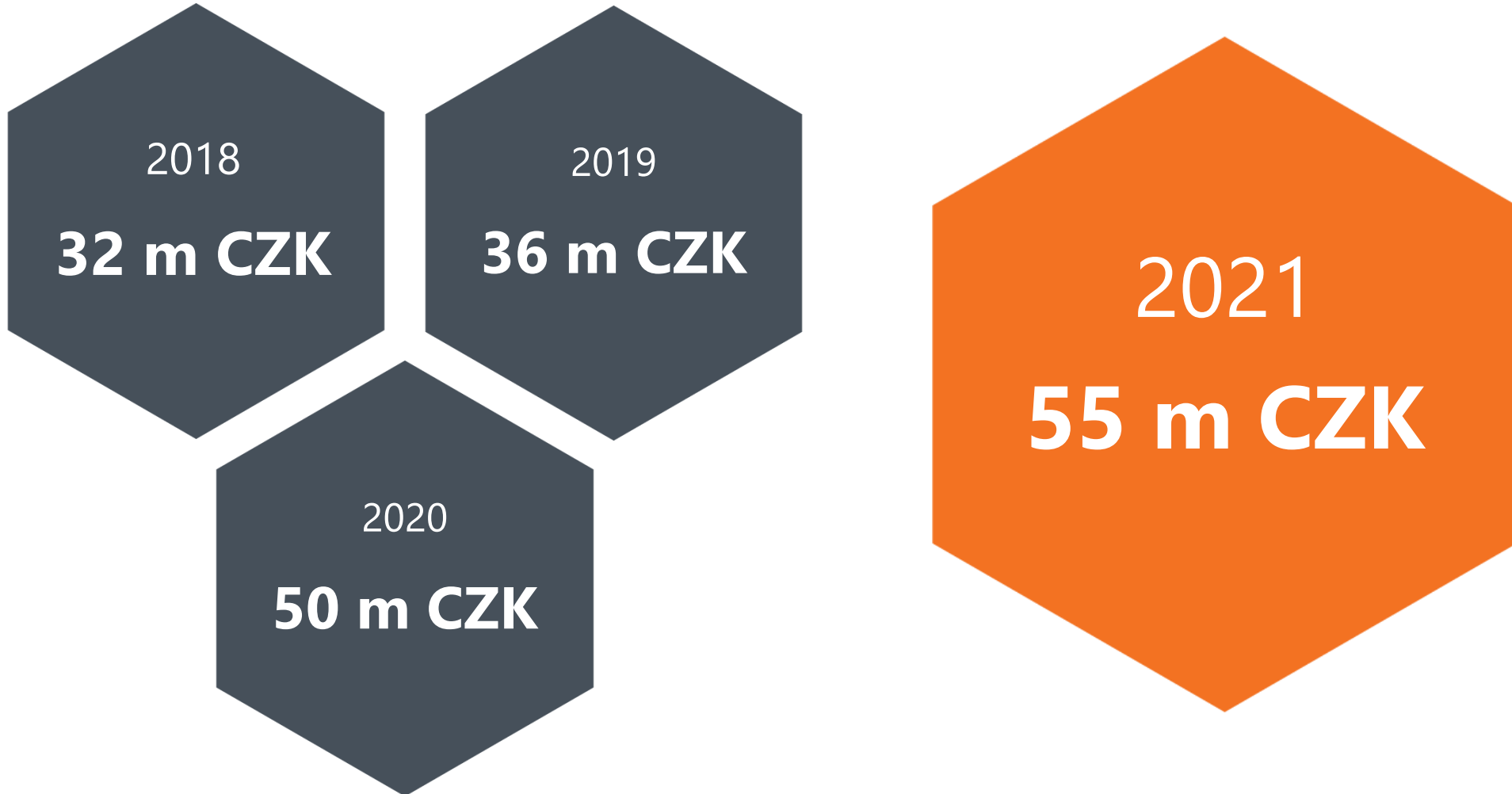
2021



\*OP RDE projects are not included.  
Internal development project and IGA projects are included.



# FUNDS ALLOCATED FOR LONG-TERM DEVELOPMENT (DKRVO)





# INTERNAL DEVELOPMENT PROJECTS (DKRVO)

Identification code	Title	Chief researcher	Funds allocated in 2020 (CZK)	Funds allocated in 2021 (CZK)
RP/CPS/2020/001	Smart scaffolds	Prof. Humpolíček	1,151,710	2,334,000
RP/CPS/2020/002	Environmental materials and technologies for safe and sustainable society	Prof. Sedlařík	2,371,353	6,792,000
RP/CPS/2020/003	Progressive processing technologies of polymeric materials and filled polymer systems	Assoc. prof. Sedláček	4,340,590	8,688,000
RP/CPS/2020/004	Experimental approach to the description of dissipation energy in the vicinity of the crack front or rubber during its loading	Assoc. prof. Stoček	2,617,554	5,760,000
RP/CPS/2020/005	Energy and composite materials and devices	Prof. Sába	3,841,291	7,800,000
RP/CPS/2020/006	Smart nanomaterials: from basics to application	Assoc. prof. Kuřitka	5,737,581	13,080,000

**Total**

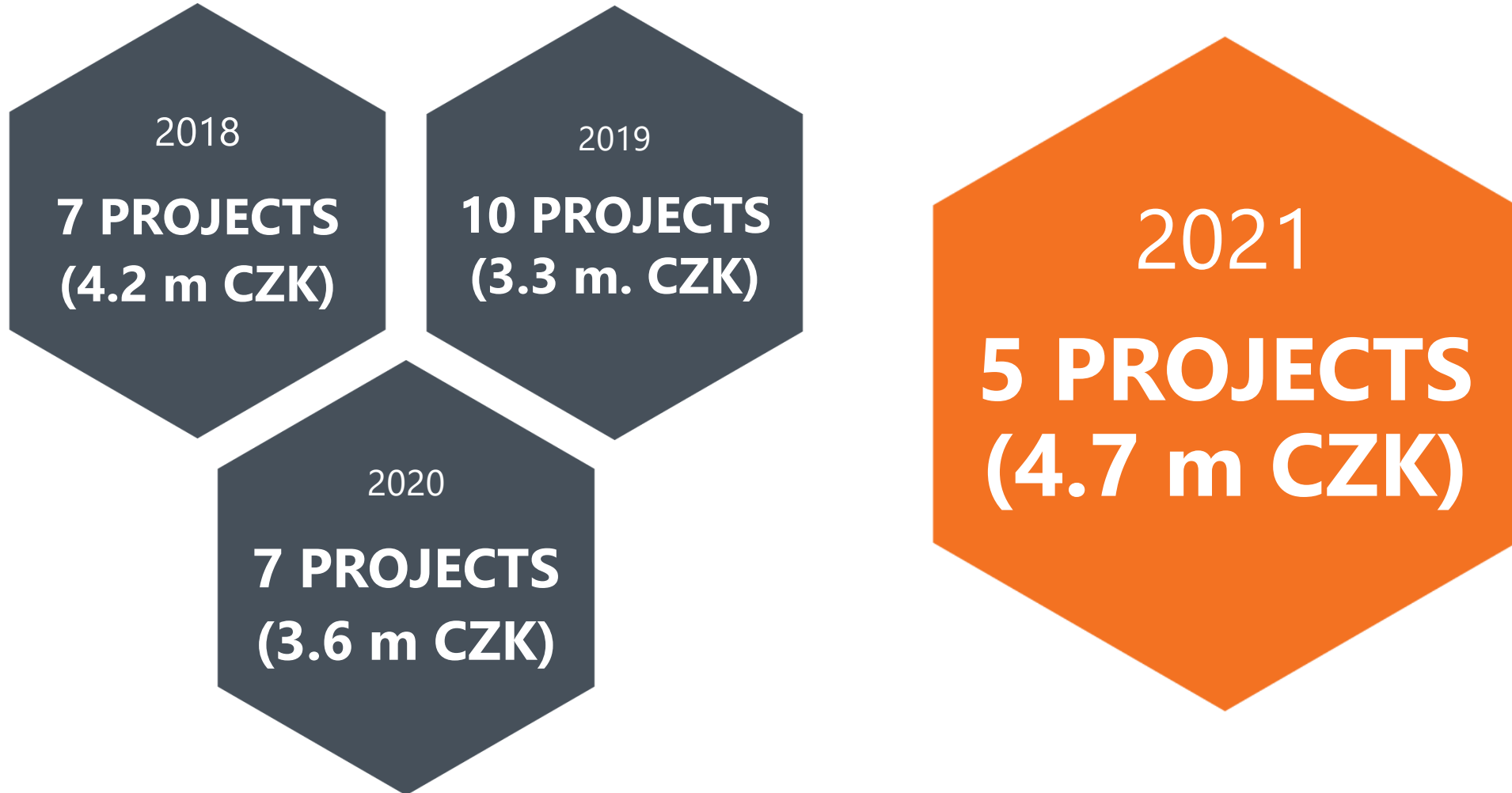
**20,060,079**

**44,454,000**





# INTERNAL GRANT AGENCY PROJECTS FUNDS ALLOCATED



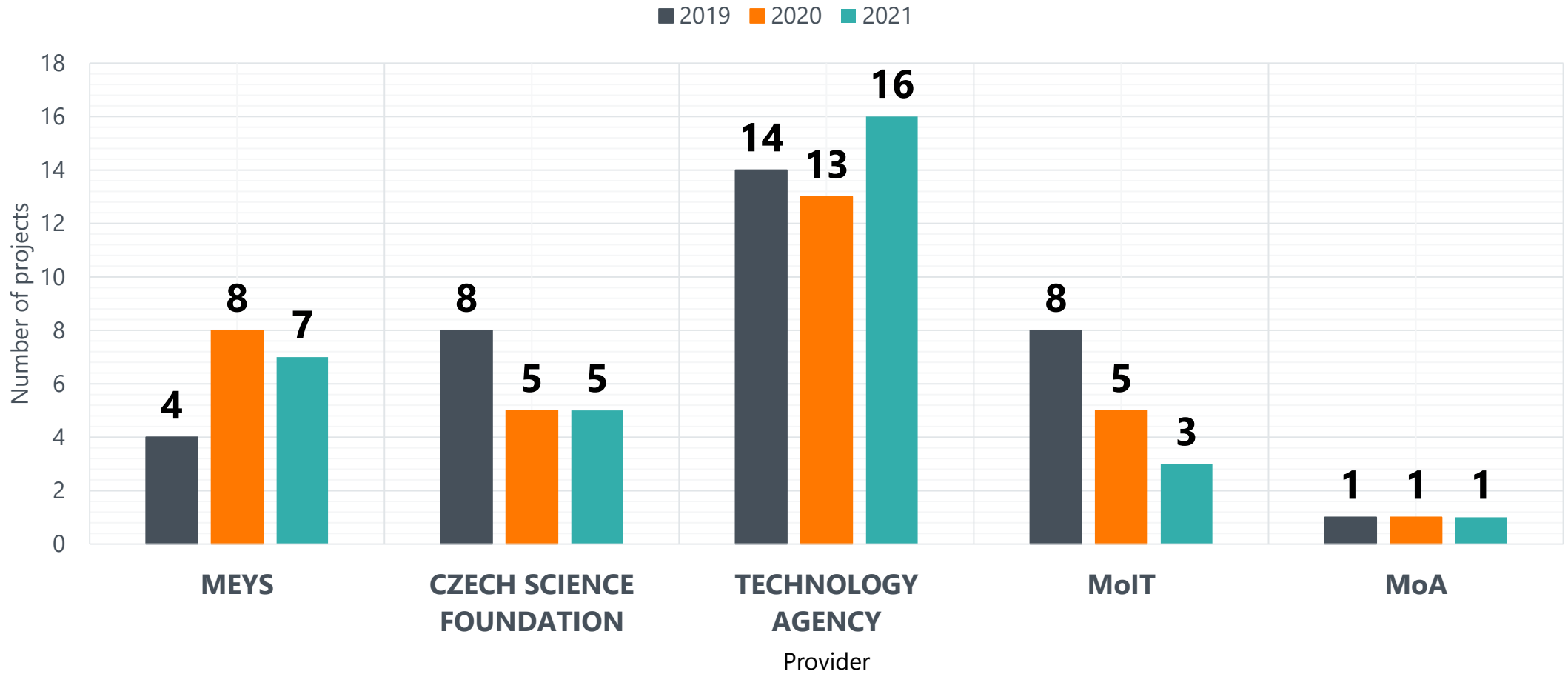


# INTERNAL GRANT AGENCY PROJECTS IN 2021

Identification code	Project name	Chief researcher	Funds allocated
<b>IGA/CPS/2021/001</b>	Biocompatibility of materials	Ing. Káčerová (Prof. Humpolíček)	1,424,000
<b>IGA/CPS/2021/002</b>	Preparation and characterisation of nanocomposite systems	Ing. Muchová (Assoc. Prof. Kuřitka)	1,898,000
<b>IGA/CPS/2021/003</b>	Piezoresistance of advance materials	Ing. Ronzová (Assoc. Prof. Sedlačík)	616,000
<b>IGA/CPS/2021/004</b>	Preparation and characterisation of smart systems based on thermoplastic elastomers and magnetic particles prepared using 3D printing	Ing. Gorgol (Dr. Mrlík)	202,000
<b>IGA/CPS/2021/006</b>	Producing a database of values of initiation energy, T <sub>0</sub> , based on the variation of primary rubber mixture ingredients	Ing. Machů (Assoc. Prof. Stoček)	172,000



# NUMBER OF EXTERNAL R&D PROJECTS\*



\*OP RDE, IGA and internal development projects are not included.



# MEYS R&D PROJECTS IN 2021

	Identification code	Title	Chief researcher	Funds allocated in 2021 (CZK)
1	8JPL19031	Development of novel additives for thermoplastic processing of biodegradable polymers	Prof. Sedlařík	80,000
2	LTAB19019	Preparation of nano- and micro-structured materials using self-organized protein fibrillar systems	Dr. Minařík	390,000
3	LTAUSA19066	A study of polymeric memristors based on methacrylate polymers with pendant carbazole moieties	Assoc. Prof. Vilčáková	950,000
4	8J20PL026	Biodegradable polymer nanocomposite systems with improved thermal and mechanical properties	Dr. Pummerová	60,000
5	8X20041	Design and preparation of multifunctional magnetic nanoparticles for cancer cells detection	Assoc. Prof. Vilčáková	148,000
6	LTT20005	Cooperation with EASE on the development of a hybrid supercapacitor	Prof. Sába	1,766,000
7	LTT20010	Surface functionalized glass: Concept of heterostructured nanoparticles inspired by arteficial photosynthesis	Dr. Machovský	1,610,000



# CZECH SCIENCE FOUNDATION PROJECTS IN 2021

	Identification code	Title	Chief researcher	Funds allocated in 2021 (CZK)
1	19-16861S	Interaction of stem cell biomaterials under simulated <i>in vivo</i> conditions	Prof. Humpolíček	1,526,000
2	19-23513S	Towards novel electroluminescent materials: Borane cluster compounds in thin polymer films within an electric field	Assoc. Prof. Kuřitka	1,762,000
3	19-17457S	Manufacturing and analysis of flexible piezoelectric layers for smart engineering	Dr. Mrlík	952,000
4	19-23647S	Investigation of correlation between cation distribution, particle size and physical properties of intelligent spinel ferrite nanomaterials	Dr. Yadav	1,614,000
5	20-28732S	Colloidal systems for topical formulations. Pickering emulsions and polymer based colloids	Prof. Humpolíček	1,742,000



# TECHNOLOGY AGENCY PROJECTS IN 2021

	Identification code	Title	Chief researcher	Funds allocated in 2021 (CZK)
1	TH03020117	Conductive materials and their application for antistatic and dissipative treatment of the paper and polymeric products	Prof. Sedlařík	630,000
2	TH04020466	Longfiber composites for serial production	Assoc. Prof. Sedláček	596,000
3	FW01010588	Filters for removal of biologically active molecules from the drinking water	Prof. Sedlařík	1,552,500
4	FW01010620	Research and development of materials and technology of small batch production of structural and sealing elements	Dr. Machovský	1,238,625
5	FW01010327	Advanced polymer and composite materials for additive manufacturing	Assoc. Prof. Vilčáková	984,375
6	FW03010465	Technologic production waste as an innovative source of material in manufacturing non-woven fabrics	Assoc. Prof. Sedláček	2,925,000
7	FW03010006	Permanent protection of touch screens preventing deposition of organic pollutants on the surface of the screen	Dr. Pummerová	1,170,000
8	TK03030157	Next generation all-solid-state Li-ion batteries	Prof. Sába	3,886,767



# TECHNOLOGY AGENCY PROJECTS IN 2021

	Identification code	Title	Chief researcher	Funds allocated in 2021 (CZK)
9	TH71020005	Bioactive injectable hydrogels for soft tissue regeneration after reconstructive maxillofacial surgeries	Assoc. Prof. N. Saha	293,358
10	TH71020006	Li-ion battery and supercapacitor hybrid device	Prof. Saha	417,081
11	TP01010006	Innovative design of micro-fibre optic cable protectors	Prof. Slobodian	523,125
12	TP01010006	The technology of processing plastic recyclates with mineral fillers for composites preparation	Ing. Císař	850,000
13	TP01010006	Novel biodegradable composition based on a degradable polymer and a material of natural origin	Dr. Pummerová	850,000
14	TP01010006	Recycling biologically degradable waste through processing for grower applications	Ing. Válková	296,250
15	TP01010006	Validation of a concept of testing equipment for accelerated analysis of rubber aging description	Assoc. Prof. Stoček	367,240
16	TJ02000269	Nano-structured filtration materials for removal of arsenic from water	Dr. Domincová	104,000



# MINISTRY OF INDUSTRY AND TRADE

## PROJECTS IN 2021

	Identification code	Title	Chief researcher	Funds allocated in 2021 (CZK)
1	FV30048	New additives for multifunctional modification of polymeric surfaces	Prof. Sedlařík	1,189,400
2	FV40377	Research and development of a biocompatible material for controlled drug release and transport into the cornea	Dr. P. Urbánek	754,400
3	CZ.01.1.02/0.0/0.0/20_321/0024533	Design lamp with potted LEDs and a homogenous radiating surface	Prof. Sába	563,470





# MINISTRY OF AGRICULTURE PROJECTS IN 2021

	Identification code	Title	Chief researcher	Funds allocated in 2021 (CZK)
1	QK1910392	Environmentally friendly soil conservation materials for the crop production intensification based on renewable resource	Prof. Sedlařík	1,261,000

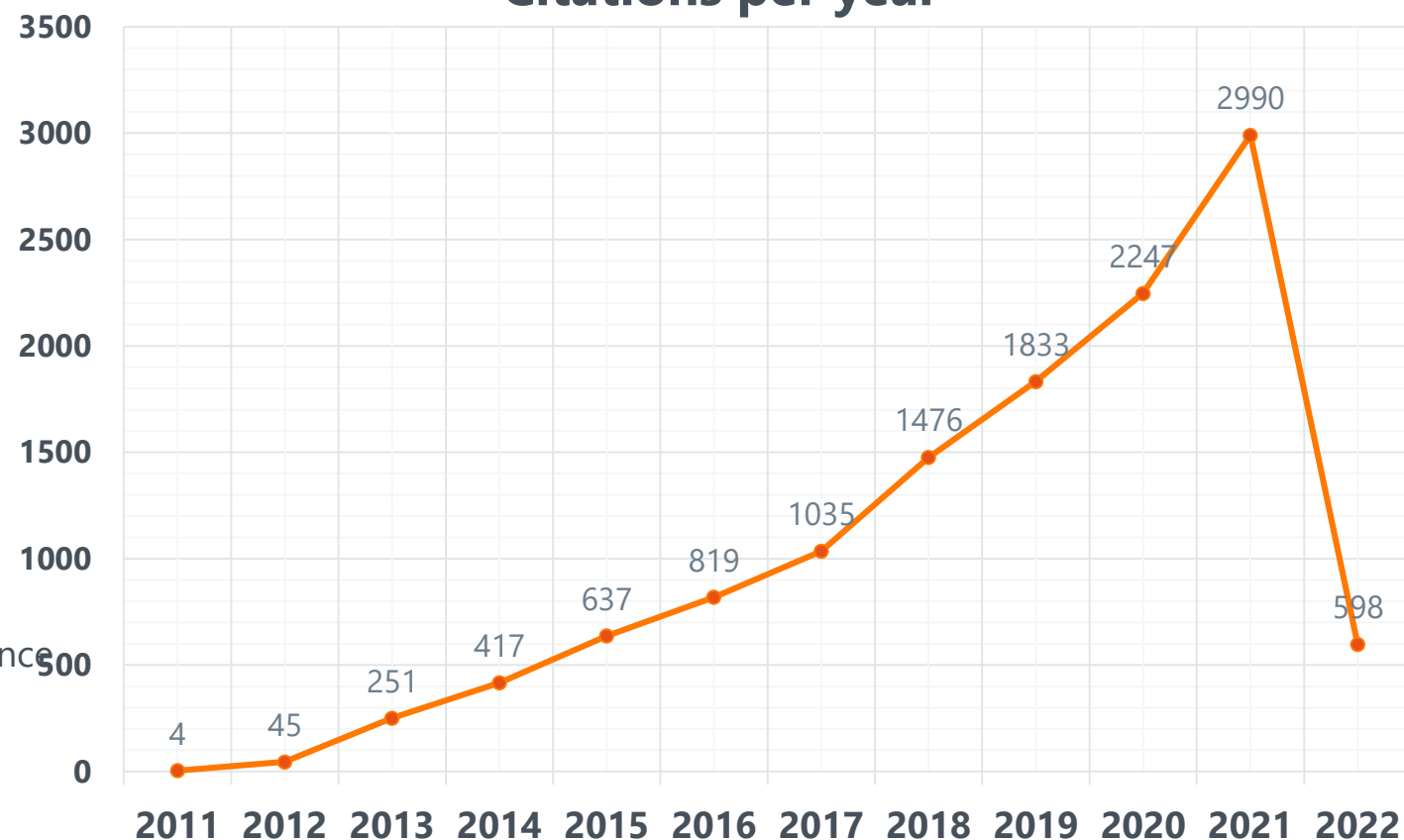
# PUBLICATION OUTPUTS IN WoS

Web of Science | from 2011 to 27 April 2022

Selected document types	Number of documents
Article*	837
Proceedings paper*	214
Review	22
Book chapter	11

\*Some of the outputs are both, articles and conference papers.

Citations per year





# NUMBER OF ARTICLES IN WoS

Articles in Journals with Impact Factor



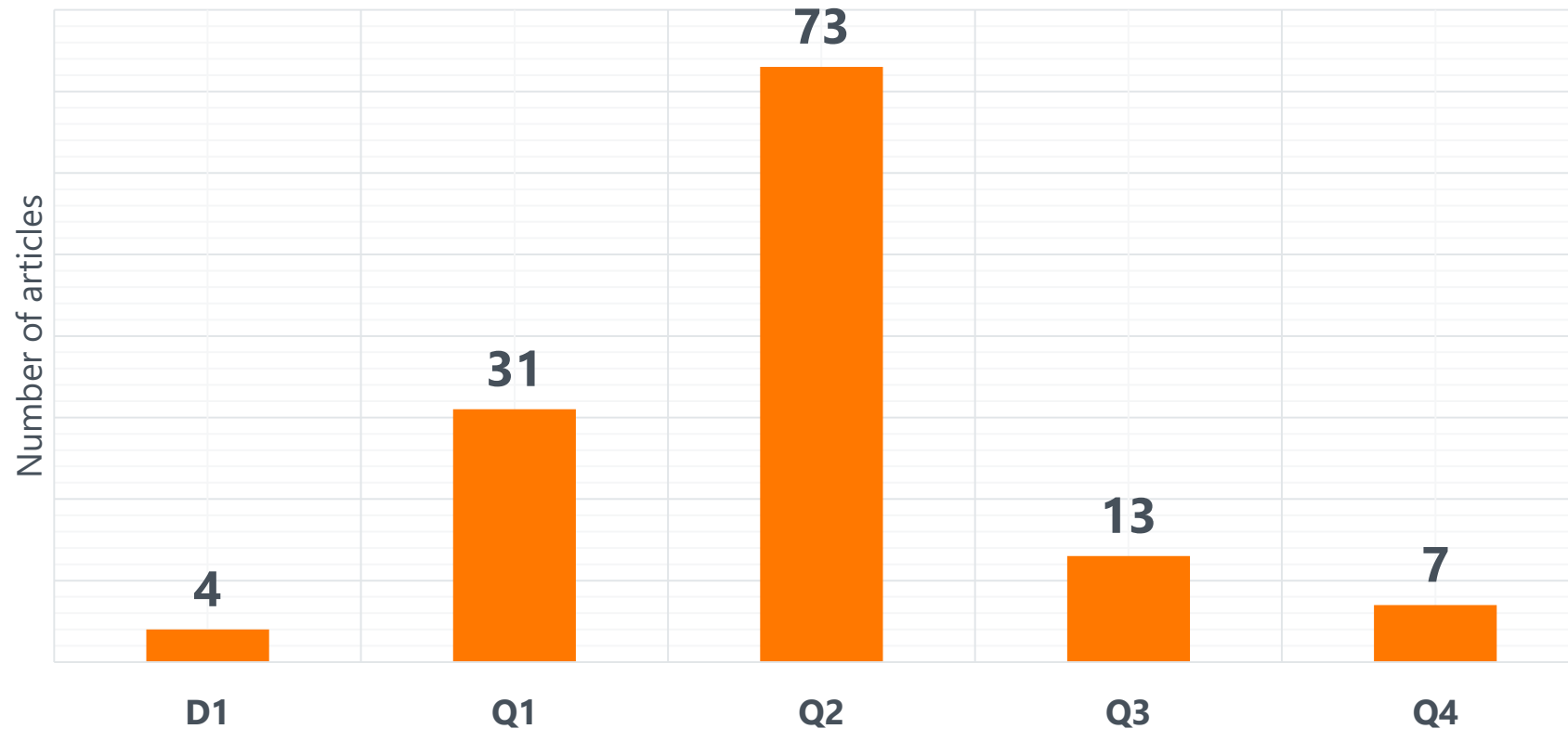


# QUALITY OF PUBLISHED ARTICLES IN 2021

## Impact Factor (WoS) vs Article Influence Score (FORD)

128 articles

based on AIS

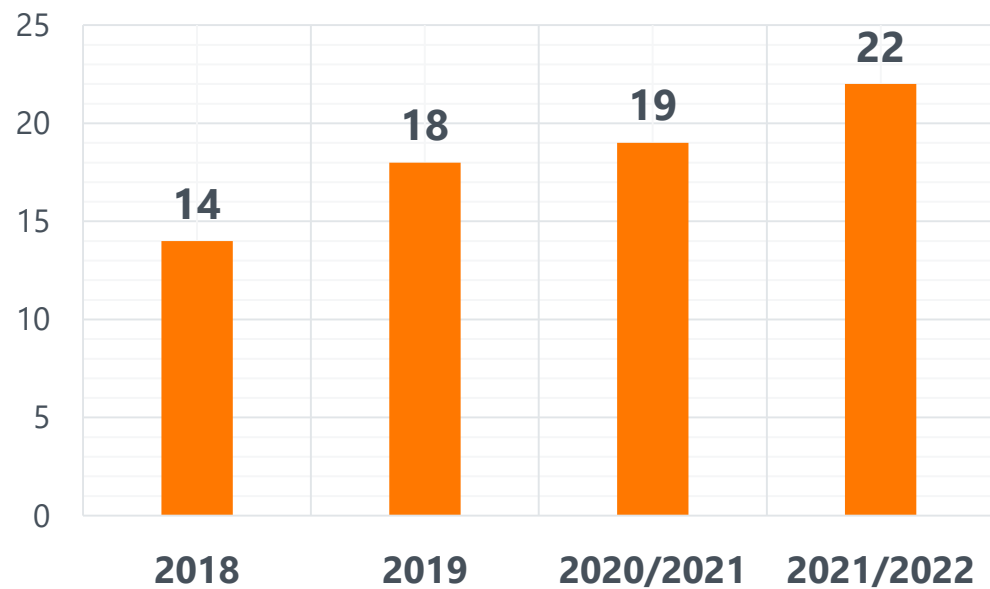


# **TEACHING ACTIVITY**

# PHD STUDY PROGRAMMES

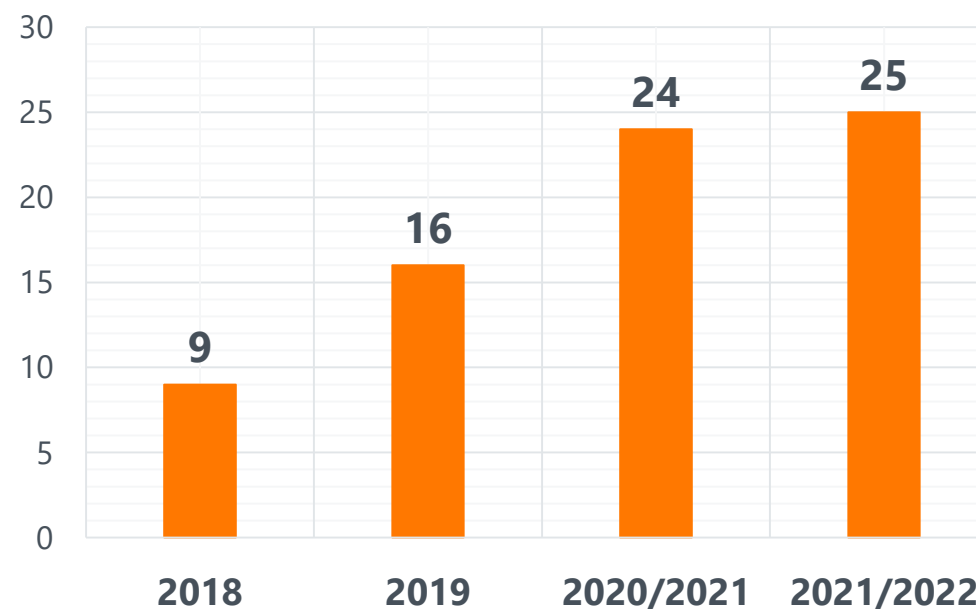
## Biomaterials and Biocomposite

Number of students



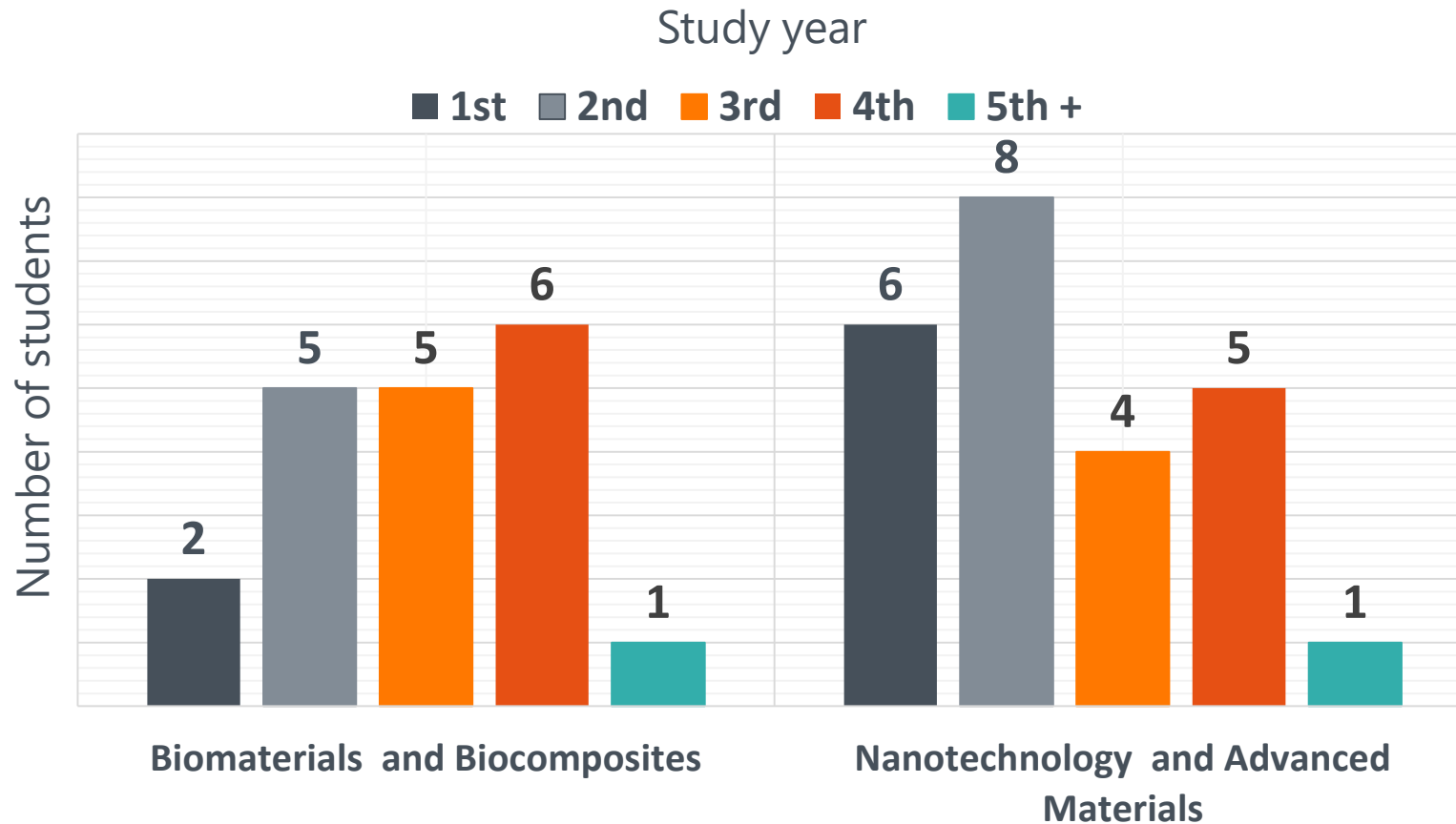
## Nanotechnology and Advanced Materials

Number of students





# NUMBER OF DOCTORAL STUDENTS IN 2021

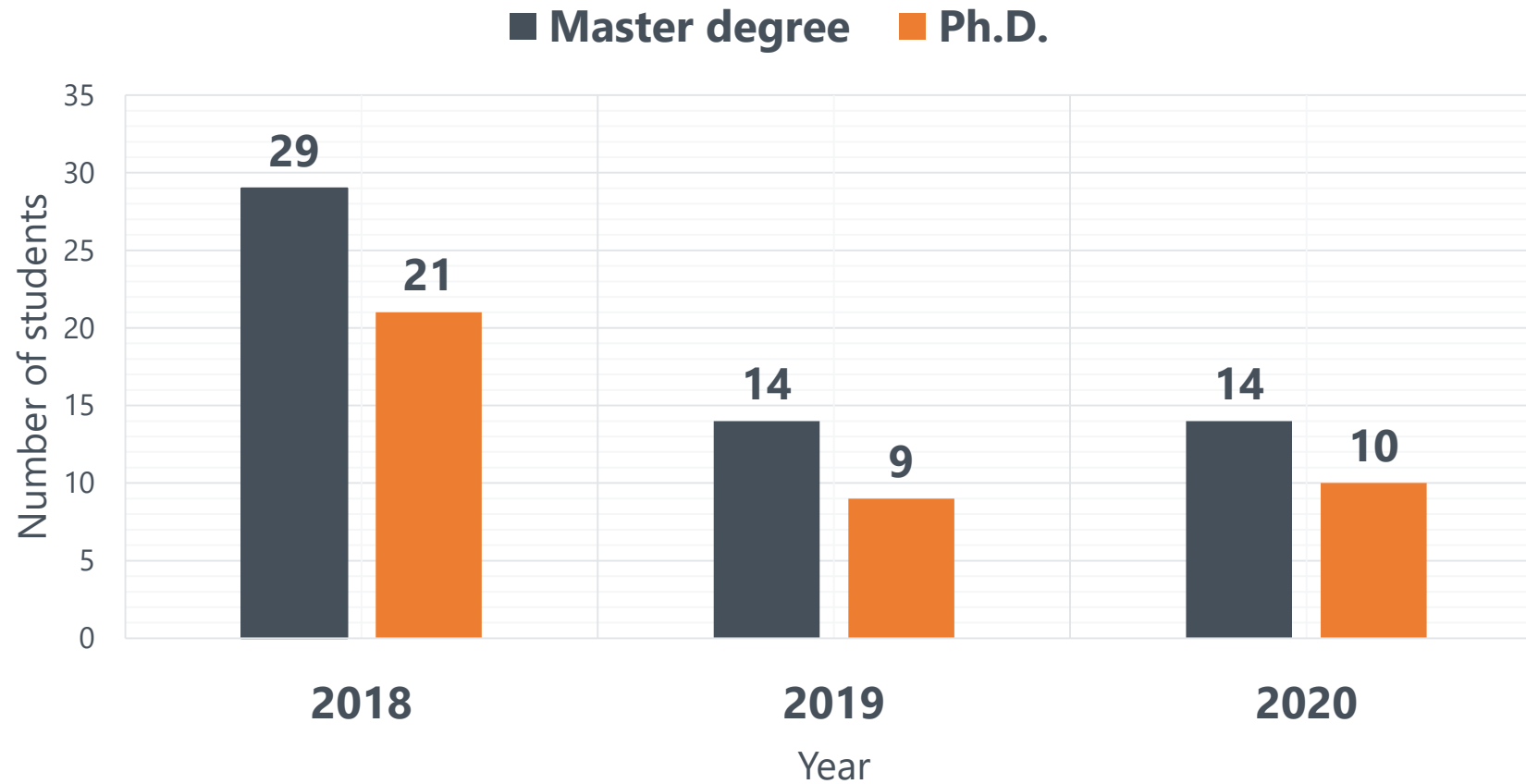


As at 31 May 2021, three more students were admitted – two of them conditionally – to study Biomaterials and Biocomposites.

Two more applications have been registered for the same course.



# STUDENTS FROM OTHER FACULTIES AT CPS





**CONTRACTED RESEARCH**



# CONTRACT RESEARCH



**THE EUROPEAN CHARTER FOR  
RESEARCHERS AND THE CODE  
OF CONDUCT FOR RECRUITMENT  
OF RESEARCHERS (EC&C)**



**EC&C**



EUROPEAN UNION  
European Structural and Investment Funds  
Operational Programme Research,  
Development and Education



- ◆ [https://euraxess.ec.europa.eu/sites/default/files/am509774cee\\_en\\_e4.pdf](https://euraxess.ec.europa.eu/sites/default/files/am509774cee_en_e4.pdf)
- ◆ <https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:32005H0251&from=CS>

Project funded from OP RDE **The Development of Capacity for Research and Development of TBU in Zlín**  
CZ. 02. 2. 69 / 0.0 / 0.0 / 16\_028 / 0006243.

# **MISSION, VISION & STRATEGY**



**MISSION**



EUROPEAN UNION  
European Structural and Investment Funds  
Operational Programme Research,  
Development and Education



Support research and its links with the field.

Project funded from OP RDE **The Development of Capacity for Research and Development of TBU in Zlín**  
CZ. 02. 2. 69 / 0.0 / 0.0 / 16\_028 / 0006243.



EUROPEAN UNION  
European Structural and Investment Funds  
Operational Programme Research,  
Development and Education



Become a centre of excellence in research with a world-wide impact in the field of innovative, polymer-based products – an institution aiming at the long-term collaboration with its strategic partners, as well as a research entity which employs motivated and satisfied researchers, fosters the competitiveness of the region and the country, and respects its values with regard to the sustainable development of society.

Project funded from OP RDE **The Development of Capacity for Research and Development of TBU in Zlín**  
CZ. 02. 2. 69 / 0.0 / 0.0 / 16\_028 / 0006243.



# VALUES

- ◆ excellence
- ◆ creativeness
- ◆ innovation
- ◆ efficiency
- ◆ transparency
- ◆ openness
- ◆ freedom of research
- ◆ equal opportunities
- ◆ diversity
- ◆ professional responsibility
- ◆ career development
- ◆ flexibility
- ◆ mobility
- ◆ fair play
- ◆ work/life balance
- ◆ social responsibility



EUROPEAN UNION  
European Structural and Investment Funds  
Operational Programme Research,  
Development and Education





# **CODE OF ETHICS**

# PRINCIPLES OF R&D ACTIVITIES

- ◆ Members of UNI's scientific and academic staff ("staff members"):
  - Freely carry out research activities to increase the level of knowledge for the benefit of society and in line with the TBU and UNI strategies.
  - Make the results of their research and development activities available.
  - Take responsibility for the quality and reliability of the results of their R&D activities and are obliged to avoid any and all kinds of plagiarism.
  - Promote teamwork and respect the principles of publication ethics.
  - Pro-actively prevent conflicts in conducting research and development activities.
  - Provide personal examples of pursuing general ethical principles in R&D activities, especially where students are involved.

# PRINCIPLES OF R&D ACTIVITIES

- ◆ In connection with their own research and development activities, staff members shall accept their personal accountability for:
  - Non-bias in R&D activities and adequacy of choice of research methodologies.
  - Reproducibility of the R&D results and the correctness of processes for further processing of such results, including ensuring that data is archived in accordance with applicable TBU internal rules and standards.
  - Correctness of the interpretation of the results of research and development, whether the staff member's own results or results of other researchers.
  - Effective use of funds and human resources.
  - Implementation of ethically sound research and compliance with internationally recognized standards in this regard.

# PRINCIPLES OF R&D ACTIVITIES

- ◆ When publishing results in journals and collections of scientific papers, researchers shall be mindful of the credibility of the selected publication title (the issue of “predatory” journals).
- ◆ UNI staff members shall adhere to the principles of collegial conduct toward the other members of TBU staff by respecting their personality and the right to express an independent expert opinion.

# PRINCIPLES OF R&D ACTIVITIES

- ◆ Staff members shall be loyal to UNI as well as TBU. In this sense, loyalty refers to the respect for the fact that the results of the research activity carried out by the researcher as part of TBU while making use the University's technical and human resources is not something for which that researcher can be exclusively credited. The provision of such results to third institutions or persons with a view to a personal benefit of the researcher shall be considered immoral behaviour grossly infringing labour relations with TBU.

# PRINCIPLES OF R&D ACTIVITIES

- ◆ Staff members shall treat TBU's information systems with the knowledge of the obligation to use the systems solely to improve the quality of research activities, not to his or her own private benefit or that of other persons.
- ◆ Staff members are familiar with the strategic objectives in their field of research, payment mechanisms and necessary permits.
- ◆ Staff members are required to inform UNI on any changes in the research project, such as delays, re-definition, addition, early termination or suspension.

# **PRINCIPLES OF R&D ACTIVITIES**

- ◆ UNI shall not discriminate against members of staff on the basis of gender, age, ethnic/national/social origin, religion/belief, sexual orientation, language, disability, political opinion, or social/economic conditions.
- ◆ UNI establishes a system of evaluating staff members that allows for regular and transparent evaluation of performance at work.







**THANK YOU!**

**Vladimír Sedlařík**  
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