

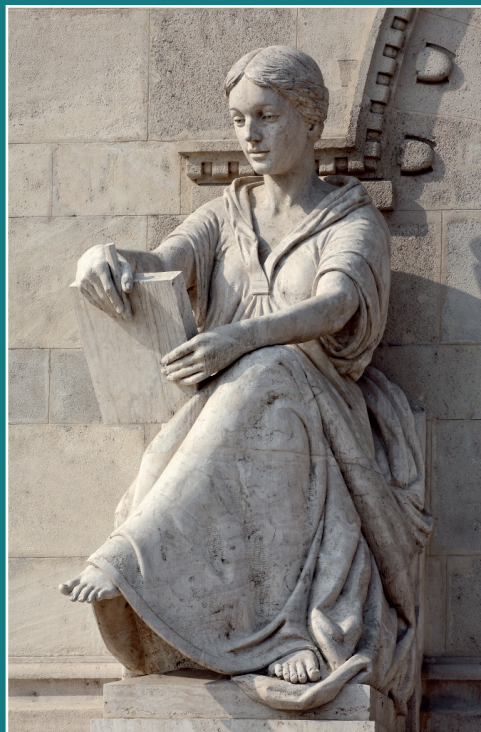
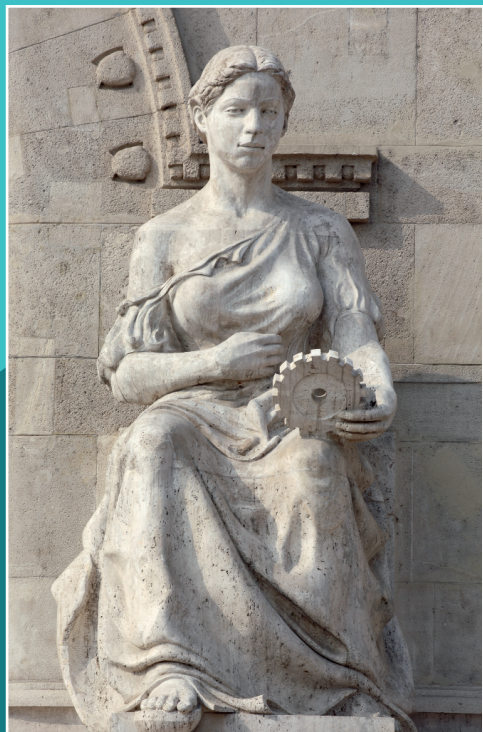
BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
FACULTY OF CHEMICAL TECHNOLOGY AND BIOTECHNOLOGY



RESEARCH AND DEVELOPMENT



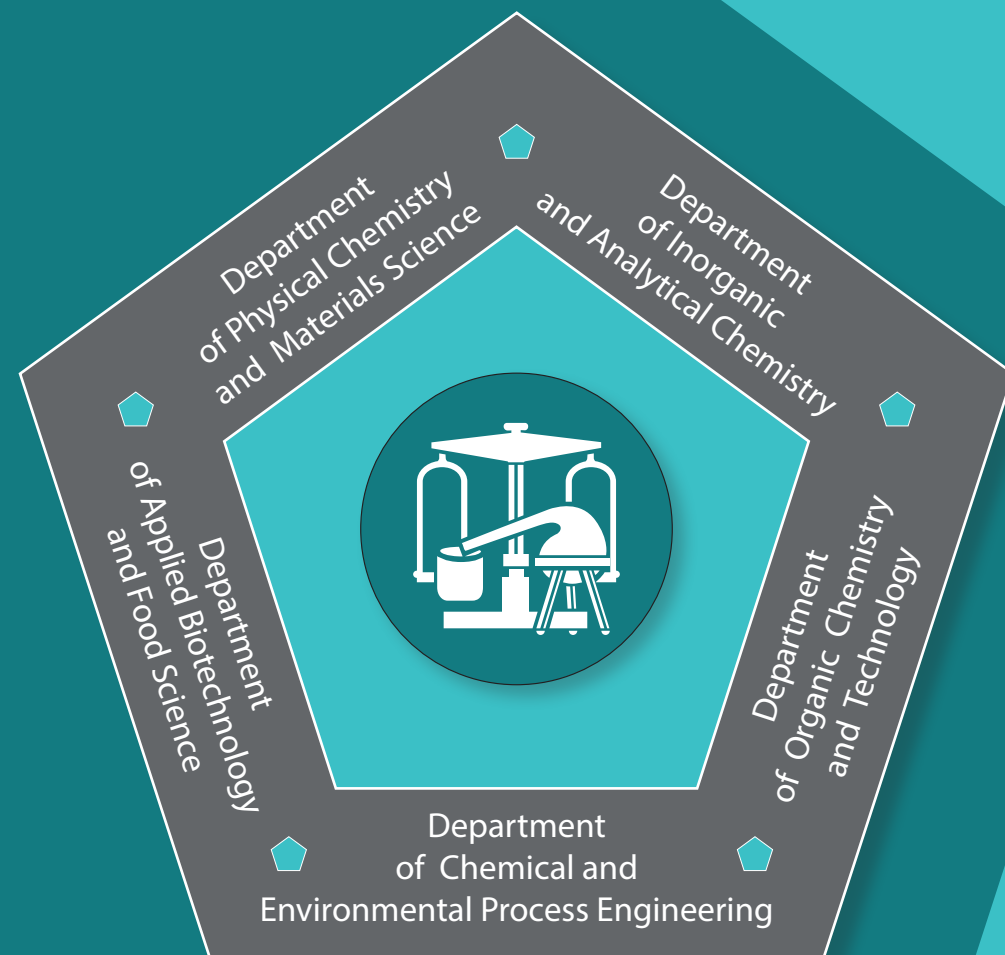
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INTRODUCTION OF THE FACULTY

The education of chemical engineers and chemists has a long tradition at the Budapest University of Technology and Economics (BME). The Faculty of Chemical Technology and Biotechnology (VBK) was founded in 1873, and nowadays trains biochemical engineers, chemical engineers, and environmental engineers at BSc level and has 5 specializations at MSc level: Biochemical Engineering, Chemical Engineering, Engineering in Pharmaceutical Industries, Engineering in Polymer and Fibre Technology, Environmental Engineering.

THE FACULTY CONSISTS OF FIVE DEPARTMENTS



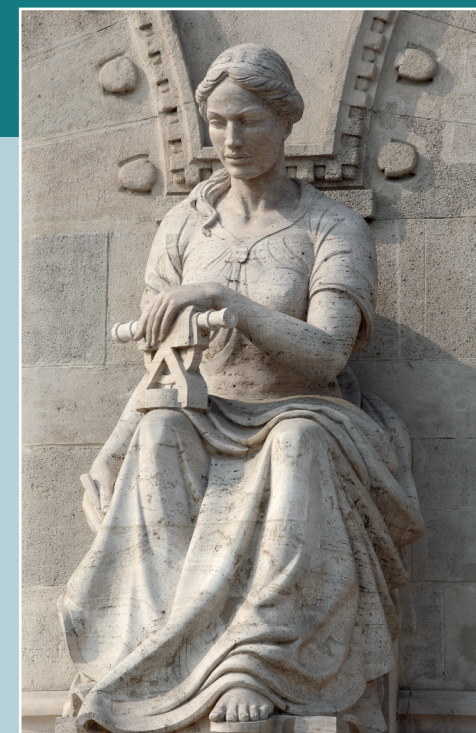
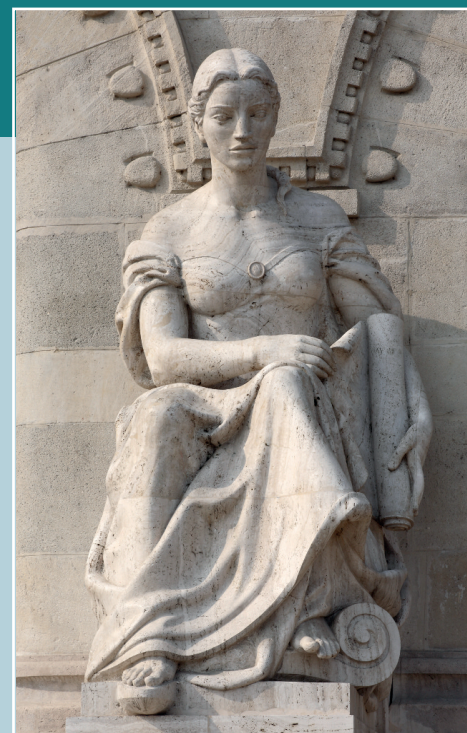
Our Faculty places a particular emphasis on R&D&I activities in accordance with the social mission of our university. The scientific activities are connected to the national Research University program (<https://research.bme.hu/portal/>). Research priorities are related to the fields of analytical chemistry, inorganic and organic chemistry, chemical technology, pharmaceutical innovation, process engineering, biotechnology, health and environment protection, food related topics, nanotechnology, material science, polymer technology. The high-level research work and productive collaboration of the university with national and international research groups result in high number of international publications, patents and industrial applications.

As a recent example of our industrial collaborations, a joint laboratory called "Pharmatech Model Laboratory (PML)" with Gedeon Richter Plc. was founded at the Faculty in 2015. The main mission of the Pharmatech Model Laboratory (PML) is to serve as a model for the integrated pharmaceutical industry of the future. The laboratory prefers continuous technology equipped with sensors, providing real-

time monitoring of product quality, and communication system allowing information flow between the units of operation. PML integrates various cooperating laboratories serving the same purpose.

The Biotech Model Laboratory (BML) of the Faculty is based on the recombinant DNA technology. This organisation of BML gives the possibility to solve complex research & development & innovation problems for the other research units of the university as well as for industrial and academic partners outside the university. This complex organisation of BML also gives an excellent background for the education of biochemical engineers. The students have the ability to get acquainted with all the important processes of modern biotechnology working on industrial problems in the BML.

Our research strategy includes the exploitation of scientific and technical results to achieve economic and social advances. As a part of this approach, we have a priority on technology transfer activities, encouraging our researchers to use their research outputs as intellectual products leading to new products and technologies.



WE OFFER OUR STRENGTHS AND KNOWLEDGE FOR COLLABORATIONS

- Development of new materials, methods, technologies, and instrument setups.
- Extensive characterization, analysis and testing of different materials. Synthesis of new molecules based on the principles of green chemistry, molecular biology.
- Improvement of existing industrial processes.

A remarkable number of BSc, MSc and PhD students are strongly involved in our research work. Our undergraduate

students present their award-winning results at the annual Students' Scientific Conferences.

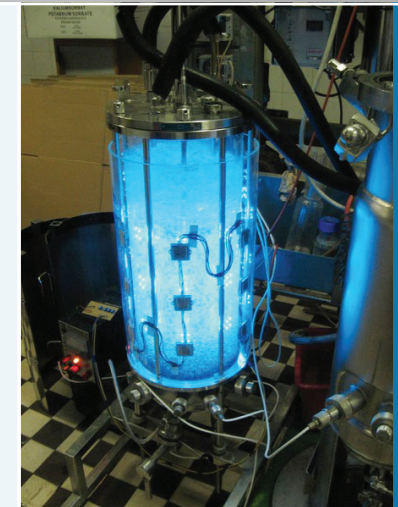
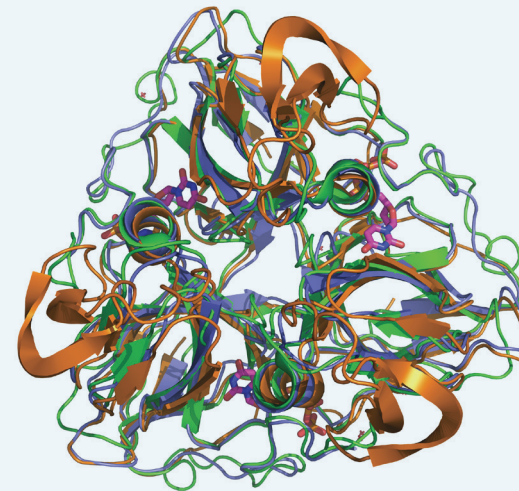
Our PhD students complete their theses with high scientific impact at the George Oláh PhD Graduate School, named after our famous professor who was awarded the Nobel Prize in Chemistry in 1994 „for his contribution to carbocation chemistry”.

For more detailed information about our intellectual and infrastructural resources, and for highlights of the R&D&I activity, please visit our website: <http://ch.bme.hu/en/research/>

The main areas of professional activity at the Department of Applied Biotechnology and Food Science (ABET) are biochemistry, molecular biology, food science, biotechnology and relating border areas. We consciously pursue the modern, professionally authentic, cumulative cultivation of our three basic activities, i.e. the education, research & development & innovation and services. The curricula of the four-level education (BSc, MSc, PhD and vocational training), is continuously improved by strengthening the interdisciplinarity, which is characteristic in the field of bioengineering.

We have built professional relationships with a number of domestic and foreign (predominantly European) enterprises and more than 100 European research institutes primarily in European framework programs implemented and in activities of research and development, education and training.

Main industrial partners: Gedeon Richter Plc., Egis Pharmaceuticals Plc., Ceva-Phylaxia, Fermentia Ltd., UTB Envirotec Ltd., Budapest Sewage Works Ltd., Organica, Gyermelyi, Lipóti Bakery, Univer Product Plc., Hunest Biorefinery, Cyclolab Ltd.

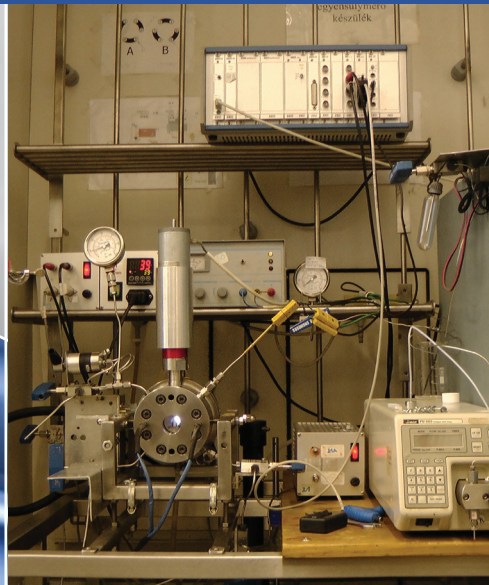


In the education, beside the continuous improvement of the curriculum, we try to develop individual, problem-solving, special engineering tasks, which improve the ability of presentation and team working, and develop new skills. In our vocational trainings designed for practicing professionals we offer short-term courses, which are flexibly adjusted to the market demands, and meet industrial needs.

On an average of many years the Department participates in 40-50 national and international R&D&I projects as professional partner, and in many cases it undertakes the coordination.

Research groups of the department

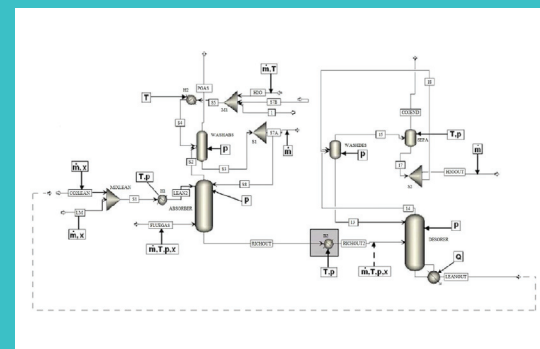
- Biorefinery Research Group
- Biostruct laboratory
- Cell cycle and genomics research group
- Environmental Microbiology and Biotechnology
- Fermentation-laboratory
- Industrial Microbiology Research Group
- Laboratory of Biochemistry and Molecular Biology
- NIR Spectroscopy Research Group
- Research Group of Cereal Science and Food Quality
- Wastewater Biotechnology Research Group



The Department of Chemical and Environmental Process Engineering (KKFT) has different research groups focusing on varying fields of chemical engineering.

From the field of environmental and process engineering the research focus is on separation systems, distillation, clean technologies and membrane separations. Another field is chemical technology and energetics, where the focus is on water technologies, waste water treatment and nuclear technologies. There is a group that focuses on catalysis, biomass-based technologies and green chemistry. In addition to these, there is a group working with extraction operations, studying traditional solid-liquid extractions, supercritical fluid extraction and separation of chiral compounds using supercritical fluids. Finally, there is a group working on statistical engineering and design of experiments. The Department has been completing numerous industrial projects on its main research fields.

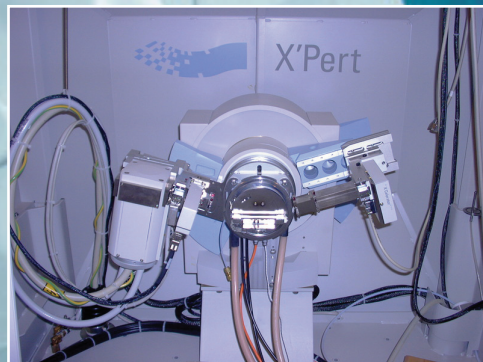
The teaching of engineering is the most important in the Department. The laboratory practice in our pilot plant laboratory enables the students to ground and deepen their practical knowledge. The Department offers courses for students from other faculties, such as faculty of economic, mechanical engineering and transportation engineering.



Our most important industrial/research partners: MOL, BorsodChem, TVK, Olajterv, Paks Nuclear Power Plant, MTA MUKKI.

Research groups of the department

- Industrial Statistics Research Group
- Research Group of Catalysis and Biomass Conversion
- Research Group of Chemical Technology and Energetics
- Research Group of Environmental and Process Engineering
- Research Group of Supercritical Fluids



The Department of Inorganic and Analytical Chemistry (SZAKT) has a long tradition, as it is the first chemistry department of the university.

Our main research areas in analytical chemistry are environmental analysis; chemical and biosensors, nanosensors; chromatography; applied electrochemical research; pharmacokinetic analysis; pharmaceutical analysis. While in materials science and inorganic chemistry our main research fields are synthesis of organometallic compounds; quantum chemical investigation of inorganic and metal-organic molecules; studying carbenes and ionic liquids; preparation and application of nanostructures, gas sensing, photocatalysis, atomic layer deposition; analysis of the structure and thermal behaviour of solid materials; preparation, structure and application of silicones.



The department has close collaboration with Hungarian Academy of Sciences (MTA) in the frame of MTA-BME Technical Analytical Chemistry Research Group and the MTA-BME „Lendület” Chemical Nanosensors Research Group of the MTA.

The research at the department is funded by Hungarian and international grants. In addition, the department is in contact with several multinational companies and SMEs. The industrial projects range from chemical failure analysis, analysis of industrial samples to joint technology developments.



Some of our larger industrial partners include Axon, BASF, Bosch, Egis Pharmaceuticals, General Electric, Nestlé, Gedeon Richter, Samsung, Sanofi-Chinoin, Teva Pharmaceutical Works, Volkswagen.

Research groups of the department

- Chromatography/Mass Spectrometry Research Groups
- Inorganic and Metal-organic Chemistry Research Group
- NMR Laboratory
- MTA-BME „Lendület” Chemical Nanosensors Research Group
- MTA-BME Computation Driven Chemistry Research Group
- Research Group of Chemical and Biosensors
- Technical Analytical Chemistry Research Group

The mission of the Department of Organic Chemistry and Technology (SZKT) is well expressed by its name: besides the educational and research activity in connection with all aspects of organic chemistry, the development and teaching of industrial technologies relating to natural and synthetic materials represent the main stream of our activity. Within this scope our strategic areas include, first of all, the pharmaceutical industry (pharmaceutical engineering, pharmaceutical technology), agrochemical, fine chemical, additive and cosmetic industries, furthermore some of the applied macromolecular areas such as packaging industry, fire retarded engineering materials. The department consisting of 8 research groups carries out high level basic research and industrial development that supported by number of Hungarian and EU funded research grants.

Research groups of the department

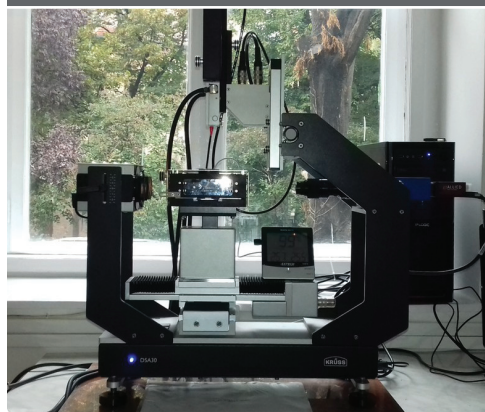
- Alkaloid Chemistry Research Group
- Bioorganic Chemistry Research Group
- Chemistry of Natural Materials and their Analogues Research Group
- Eco-friendly and Organic Phosphorus Research Group
- Group for Supramolecular Chemistry
- Heterogeneous Catalytic Chemistry Research Group

- Research Group of Chirrotechnology and Organometallic Chemistry
- Technology of Pharmaceutical, Environmental and Safety Materials Research Group

The research groups have Hungarian and international industrial partners mainly from the pharmaceutical industry and these collaborations resulted in high number of important patents utilized by the partner companies.

Our most important industrial/research partners: Gedeon Richter Plc., Egis Pharmaceuticals Plc., Sanofi-Chinoin, Janssen, Hovione, Zentiva, Airbus, Dassault, BASF, Meshlin Construction Ltd., PEMÜ Plc.



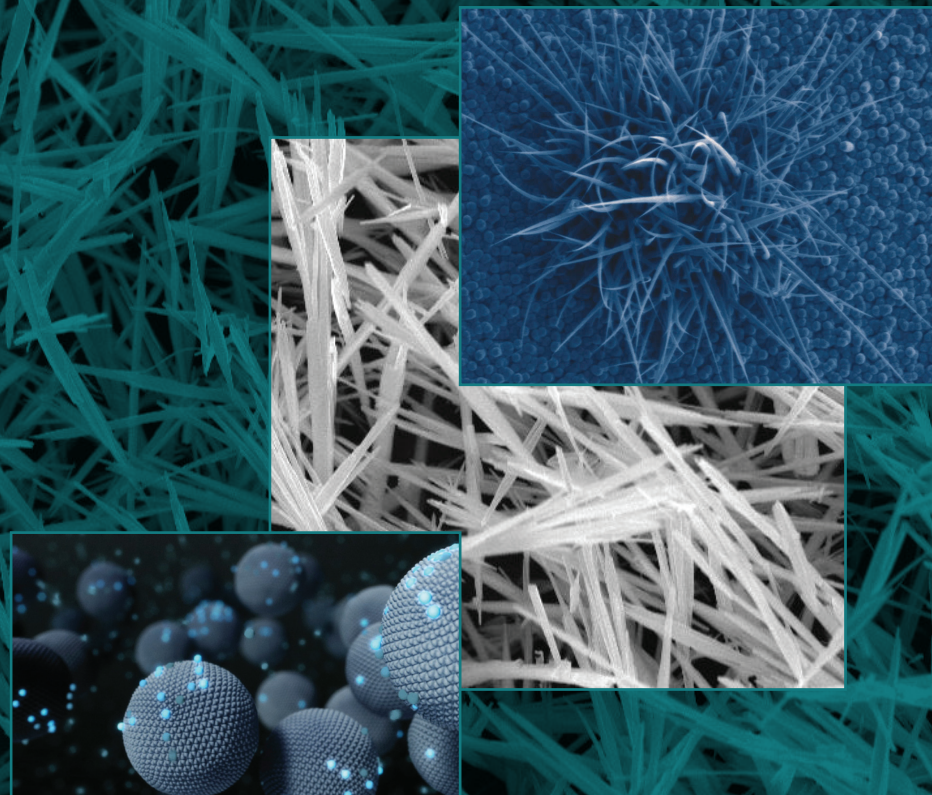


The Department of Physical Chemistry and Materials Science (FKAT) consists of five closely cooperating research groups at present.

Besides molecular modelling, modern surface science, the study of photo-physical, -chemical and biological phenomena, the wide range of our research areas includes the development of new materials and composites, the preparation and characterization of nanostructures and intelligent biocompatible materials, up-to-date research on textile chemistry, but also the solution of practical, technological problems arising in related industries. Our groups carry out high level basic research confirmed by their intensive publication activity and the large number of Hungarian and international, mostly EU funded research grants won.

Our activity and results in high level basic research were also acknowledged by an ERC research grant and by the Hungarian Academy of Sciences (MTA) by the establishment of a „Lendület” research group in 2013.

We collaborate with numerous industrial partners in research and development through various, usually long-term projects and cooperation agreements. As a result of these programs and our result-oriented mentality and ability to solve practical problems, several members of our groups have filed joint patents with companies.



Our most important industrial/research partners: Borealis, Coloplast, Egis Pharmaceuticals Plc., General Electric, Hirschmann Car Communication, HungaroLux Light, Knorr-Bremse, MOL Petrochemicals, SABIC, Teva Pharmaceutical Works Ltd., Zoltek.

Research groups of the department

- Centre for Colloid Chemistry
- Laboratory of Plastics and Rubber Technology
- Soft Matters Group
- Spectroscopy Laboratory
- Surface Chemistry Group



For further information please contact
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WEB: [HTTP://CH.BME.HU](http://ch.bme.hu)