Cooperation in industry-oriented research in an enlarged Europe

Info- and brokerage event in new technologies and materials (FP7/2007: NMP/ICT)

Calls (topics) of Interest for 2007 on ICT and NMP

NMP-2007-2.1-1 Nanostructured polymer-matrix composites

NMP-2007-4.0-4 Substantial innovation in the European medical industry: development of nanotechnology-based systems for in-vivo diagnosis and therapy (in coordination with topic HEALTH-2007-2.4.1-7: Improving targeted drug delivery to cancer cells for cancer therapeutics other than gene therapy

Institution (Organisation)

Institution:
Babes-Bolyai University of Cluj-Napoca
Faculty of Chemistry and Chemical Engineering
Department of Physical Chemistry
Laboratory: Physical Chemistry of Nanostructured Multifunctional Systems
Contact Person: Prof. Univ. Dr. Maria Tomoaia-Cotisel
E-mail: mcotisel@yahoo.com

Experience in European projects 2000-2006

Participation to European Projects:

We have long term bilateral scientific cooperation with University of London, King's College, U.K., Philipps University of Marburg, Germany, University of Paris South, Paris, France, Aristotle University of Thessaloniki, Greece, and others. Our joint publications of scientific research articles, books and patents represent a traditional way to share the achievements from our research and innovative activity.

We have a strong interest to cooperate in a consortium that deals with nanosystems and nanostructured multifunctional materials, in which we take care of nanofabrication and characterization methods.

Competence / resources

Our Physical Chemistry Laboratory of Nanostructured Multifunctional Systems is centred on **nanostructured polymer-matrix composites and on drug delivery systems designed to be targeted to cancer cells for cancer therapeutics other than gene therapy.**

Our research and innovation activity is developed in collaboration with **7 Romanian partners** from **3** Universities, **3** National R & D Institutes and **1** Institute of the Romanian Academy. Our laboratory has state of the art equipments, such as **FTIR, FT-Raman, ATR, NMR, X-ray diffraction, scattering techniques, DSC calorimetry, surface imaging techniques (e.g. AFM, STM, TEM and SEM) and surface science techniques (like Langmuir technique and improved Langmuir-Blodgett techniques.**

Highly qualified human resources.

We have developed **interfacial nanofabrication methods** including improved **Langmuir-Blodgett technique**, besides **spin coating, auto-aggregation and deposition through adsorption on interfaces**. The nanostructures are thoroughly investigated by advanced spectroscopy (**UV-Vis, ^{1}H NMR, FTIR, FT-Raman, ATR**), **X-ray diffractions, DSC calorimetry,** and different **surface methods (TEM, SEM, AFM and STM).** Our group and collaborators have also high expertise to investigate the **structure of proteins** by FTIR, FT-Raman spectroscopy, ^{1}H NMR and X-ray diffraction and scattering techniques and for simulation and modeling of N-terminal amino of proteins.

Jointly with our partners, we have developed **different strategies for molecular encapsulation of different drugs in cyclodextrins (non-toxic carrier biocompounds)** to improve the drug aqueous solubility, stability and bioavailability. The inclusion complexes or supramolecular associations of different drugs and various biocompounds in cyclodextrins is obtained by **improved preparation methods: kneading, co precipitation or freeze-drying.** Their self-assemblies with glycolipids and lectins are investigated by using spectroscopic (^{1}H NMR, FTIR), X-ray diffraction, DSC methods and AFM or STM to evidence their formation.

These supramolecular associations are potential carriers/vehicles of drugs to their site of action. We focus on innovative solutions using cyclodextrins, neoglicolipids and lectins to target drugs to cancer cells for cancer therapeutics. The structure of the multifunctional supramolecular vehicles is also determined from a combination of high-resolution synchrotron powder-diffraction data and molecular mechanics calculations. Using a thermodynamic approach, the stability of these complexes is determined. Molecular modeling is employed to observe the spatial architectures of the mentioned inclusion complexes.

Proposals / interests

NMP-2007-2.1-1 Nanostructured polymer-matrix composites

Our research and innovation activity is directed to several national projects in collaboration with partners from universities and research institutes dealing with **nanostructured polymer-matrix composites.**

All projects are developed in the field of nanoscience and nanotechnology. These multifunctional composite materials are fabricated based on **nanostructured polymer-matrix composites** of gold, functionalized gold surfaces, organic compounds, e.g. based on supramolecular structures, amino acids, chitosan and inorganic materials. The main focus is to develop new nanostructured polymer-matrix biocomposites for biological and medical applications.

NMP-2007-4.0-4 Substantial innovation in the European medical industry: development of nanotechnology-based systems for in-vivo diagnosis and therapy (in coordination with topic HEALTH-2007-2.4.1-7: Improving targeted drug delivery to cancer cells for cancer therapeutics other than gene therapy)

Developing novel targeting strategies, based on proteins and peptides, for anticancer drugs using lectins for molecular recognition at the cancer membrane represents a main interest for our group. Up to now, we have developed several strategies for molecular encapsulation of different drugs in cyclodextrins (non-toxic carrier biocompounds) to improve the drug aqueous solubility, stability and bioavailability.

Our focus is on innovative solutions using cyclodextrins, neoglicolipids and lectins to target drugs to cancer cells for cancer therapeutics. The interaction between metal nanoparticles and supramolecular biostructures presents great interest in nanomedicine. Their supramolecular associations are potential carriers of anticancer drugs to their site of action.

Further info on-line Brokerage:
www.minos-euro.net/brokerage