

Marie Skłodowska-Curie ETN program MSCA-ITN-2015-EID

MULTIMAT: A multiscale approach to mesostructured material design

13 PhD positions

An initial training network for new PhD students linking self-assembly, in-situ electron microscopy, computer modelling and materials characterization to realize new routes to advanced materials that address the current needs for sustainability in our society.

MULTIMAT aims to realize new routes to advanced materials that have a highly defined and large porosity but still show the robustness for real life applications, for example in thermal insulation, catalysts, fuel cells and oil spill remediation. To this end, the project will study the mechanisms underlying "multiscale assembly": the assembly of small building blocks into larger structures that are ordered hierarchally across multiple scales, taking inspiration from natural processes of materials assembly. MULTIMAT's future aim is to understand and ultimately direct the bottom-up construction of materials with complex hierarchical structures.

To achieve this, MULTIMAT will train 13 ESRs (early-stage researchers) to become the next generation of scientists able to master this complex design-and-assembly process. The ESRs will be trained in the MULTIMAT graduate school, covering training in scientific, personal and complementary skills. All the ESRs will perform two secondments, of which at least one is carried out with an industrial partner. Consequently, the ESRs will have improved career prospects and a higher employability and will be excellently positioned to become future leaders in material design.

MULTIMAT will focus on the assembly of silica-based building blocks towards porous materials with predesigned pore architecture and predictable and optimised mechanical properties. For this a multidisciplinary approach is taken which includes:

1. the design and synthesis of building blocks with tailor made shapes and sizes,
2. their (co)-assembly into predefined ordered structures,
3. the *in-situ* electron microscopic imaging of these processes,
4. the simulation of the structure formation and the prediction of physical properties,
5. studying the properties and performance in real technological applications.

MULTIMAT is a network collaboration between the following institutions and companies:

Beneficiaries (hiring PhD students)

- Eindhoven University of Technology (The Netherlands) – Coordinator
- Utrecht University (The Netherlands)
- Stockholm University (Sweden)
- INM - Leibniz Institute for New Materials (Germany)
- University of Manchester (United Kingdom)
- Chalmers University of Technology (Sweden)
- Akzo Nobel Pulp and Performance Chemicals (Sweden)
- Separex (France)

Partner Organizations

- University of Konstanz (Germany)
- Saarland University (Germany)
- Unilever (The Netherlands/United Kingdom)
- Nanolytics (Germany)
- DENS Solutions (The Netherlands)
- DSM (Netherlands)
- Insplorion AB (Sweden)
- Johnson Matthey (United Kingdom)
- FEI company (The Netherlands)

Eligibility Criteria and Selection Procedure

Applicants need to have a relevant master degree with excellent grades. More specifically, we are interested in highly motivated students with good English communication and writing skills.

Importantly, applicants must also meet the requirements of the Marie Skłodowska-Curie Conditions of Mobility of Researchers. Researchers can be of any nationality and are required to undertake transnational mobility. This means that researchers must not have resided at their host beneficiary for more than 12 months in the past 3 years.

Successful applicants are networkers capable to interact and build strong relationships. They have a hands-on and proactive mentality. They are able to work independently and in a team and to learn new concepts outside his/her core disciplines.

Applicants are requested to apply <http://jobs.tue.nl/en/vacancy/marie-skłodowskacurie-etn-program-13-phd-positions-255683.html> the application deadline is May 2nd 2016. Selected candidates will be invited for interviews in May/June 2016.

Available PhD positions

1. Formation and self-organisation of nanoparticles with bicontinuous internal structure at Eindhoven University of Technology

Successful candidates for this position have a Master's degree in Chemistry with excellent knowledge of (macro)molecular self-assembly and/or hybrid materials synthesis. Hands-on experience in electron microscopy is a plus.

2. Controlled pore architectures through co-assembly of silica and polymer based nanoparticles at Eindhoven University of Technology

Successful candidates for this position have a Master's degree in Chemistry or Materials Science with excellent knowledge of (macro)molecular self-assembly and/or hybrid materials synthesis. Hands-on experience in electron microscopy is a plus.

3. Low dose LP-EM for multiscale imaging at Eindhoven University of Technology

Successful candidates for this position have a Master's degree in Chemistry, Physics or Materials Science with excellent knowledge of electron microscopy. Demonstrated hands-on experience with TEM and an interest in (macro)molecular self-assembly and/or hybrid materials synthesis is a plus.

4. Mesostructured and porous nanocellulose-silica hybrids for structural applications at Stockholm University

Successful candidates are highly motivated students with a background in chemistry, physics or materials science and an interest in innovative and multi-disciplinary research are encouraged to apply. A basic training in one of the following fields; nanocellulose processing, colloidal processing or self-assembly of nanomaterials will be of advantage.

5. Super-porous nanocomposite foams by directed assembly at Stockholm University

Successful candidates are strongly motivated students with a background in chemistry, physics or materials science and an interest in innovative and multi-disciplinary research. A basic training in colloidal processing or self-assembly of nanomaterials and/or SAXS or electron microscopy characterization will be of advantage.

6. Modelling the formation of complex morphologies via block-copolymers self-assembly at University of Manchester

Successful applicants have a Master's degree in Chemical Engineering, Chemistry, Physics, or Applied Mathematics. Specific competences that are required for these positions are excellent programming skills. Demonstrated experience in molecular simulation software and polymer physics is a plus.

7. Modelling the kinetics of silica growth in aggregates of semi-crystalline block copolymers at University of Manchester

Successful applicants have a Master's degree in Chemical Engineering, Chemistry, Physics, or Applied Mathematics. Specific competences that are required for these positions are excellent programming skills. Demonstrated experience in molecular simulation software and polymer physics is a plus.

8. Multiscale Assembly of Colloids using Confinement and Electric Fields at Utrecht University

Specific competences that are required for these positions are excellent knowledge of electron microscopy. Demonstrated interest in self-assembly is a plus.

9. Predicting and designing colloidal self-organisation from complex mixtures of building blocks at Utrecht University

The applicant should have a master's degree in (theoretical) physics or chemistry. Specific competences that are required for these positions are excellent knowledge of statistical physics, numerical techniques, and soft matter. Experience in Monte Carlo and Molecular Dynamics simulation and programming is a plus.

10. Structural design of porous silica-based materials at AkzoNobel

Successful candidates have a Master's degree in Chemistry or Materials Science. Specific competences that are required for these positions are excellent knowledge of materials science, surface and colloidal chemistry. Demonstrated interest/experience in microstructure analysis is a plus.

The PhD program will be performed within the Graduate School of Eindhoven University of Technology

11. Mesoporous hybrid materials with tuneable surface properties for mass transport and catalytic activity at Chalmers University of Technology

The successful candidate has a MSc degree in chemical engineering, chemistry, physics or materials science and basic training in surface and colloid chemistry, materials chemistry, soft matter and/or molecular self-assembly. Experience in X-ray scattering, mass spectrometry and electron microscopy is a plus.

12. LP-EM of self-assembly processes LP-EM of self-assembly processes at INM - Leibniz Institute for New Materials

Specific competences that are required for these positions are excellent knowledge of experimental physics. Hands-on experience in electron microscopy, nanotechnology, and microchip development is a plus.

The PhD program will be performed within the Physics Department of Saarland University Saarbrücken, Germany

13. Polysiloxane-silica aerogels for thermal insulation at Separex

Successful candidates have a Master's degree in the field of inorganic chemistry or material sciences and have an excellent knowledge of sol-gel chemistry. Experience in synthesis and characterization of aerogels is a plus. Experience in the field of high-pressure processes is an advantage, but not required.

The PhD program will be performed within the Graduate School of Eindhoven University of Technology

Salary and benefits

Researchers employed within MULTIMAT will receive salary and benefits, for three years, at the rates stipulated by the European Commission for Marie Curie researchers. The Researchers will be employed via full employment contracts with the respective institutions, carrying social benefits such as pension and social security, but also subject to regular taxes.

Their income will consist of:

- a living allowance
- mobility allowance
- family allowance

For further information contact the Network Coordinator:

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