

Innovationslabor invites applications for PhD students / postdoctoral researchers in thermal management, carbon nanotube and engineering composites research

Innovationslabor is a newly founded Laboratory at the Department of Physic, Institute of Experimental Physic, Free University Berlin that connects Department of Physic, Institute of Experimental Physic, Free University Berlin, Tomarni GmbH and number of industrial partners. Laboratory is located in building of FB Physik, FU Berlin, Arnimallee 14, 14195 Berlin, Germany.

Background. Carbon nanotubes (CNT) consist exclusively of carbon atoms arranged in a series of benzene rings rolled-up into a tubular structure. Generally, CNT are classified in two categories based on their structure and dimensions: single-walled carbon nanotubes (SWNT), which consist of one layer of cylinder graphene and have diameters from 0.4 to 2.0 nm and lengths in the range of 20-1000 nm; and multi-walled carbon nanotubes (MWNT), which contain several concentric graphene sheets and bigger dimensions with diameters in the range of 1.4-100 nm and lengths from 1 to a few microns. Their extraordinary properties, such as, high electrical and thermal conductivity, great strength and rigidity have been developed for a wealth of applications, including resilient composite materials, field emission, energy storage, and molecular electronics, among many others.

Aims & Objectives. This truly multidisciplinary project aims to study the use of carbon nanotubes as a thermal conductivity source in the Thermal Management applications. The volume of information transmitted in our information age continues to grow, and in wireless communications there is an increasing demand for higher power and higher frequencies in amplifiers used in mobile phone base stations. Because high power transistors, the output source for high-performance amplifiers, generate high levels of heat, heat dissipation is extremely important. In cooling designs of today, a metallic sink absorbs the heat generated by current in the microchip and is cooled by mechanical fans. But since the trend is to squeeze more and more functionality out of smaller chips, engineers are finding that the fans can't cool down the chips fast enough or are too big for the device. According to scientists heat is now a major factor limiting the size of lap tops. The quest to reduce the size of electronic devices provides the main driving force behind the scientific research and technological advancement in nanotechnology. The project is based on experimental work that will span carbon nanomaterial application in the thermal pastes, the engineering composites as materials for cooling devices constructions, their characterization and optimization of the manufacturing process.

Multidisciplinary Innovationslabor is currently recruiting outstanding PhD student and postdoctoral candidates to join its new research programs. These positions will be offered in the following research groups:

Group of Polymer Composites: PhD student and Postdoctoral positions

Position I.2. Postdoctoral Position Carbon Nanotubes – Liquid Crystal Polymer Composite, production and characterisation, Melt electrospinning (also care of the arrangement), fiber production LCP. We are particularly interested in candidates with a background in polymer chemistry/polymer processing with an interest in carbon nanotube based polymer nanofibers development. Experience in carbon nanotube, electrospinning, Raman characterization is kindly welcome.

Position I.3. PhD student position *Polymer – Liquid Crystal Polymer -carbon nanotubes filled fibers composites for heat sinks production, preparation and characterization, process optimization, prototyping in collaboration with engineer, microscopy study for whole project.* The ideal candidate holds a master (or equivalent) degree in one of the following fields: polymer engineering, polymer chemistry, mechanical engineering, physics, or chemistry. Experience in thermal conductivity measurement and electron microscopy is a plus.

Group of Metal Composites: PhD Student, Engineer and Postdoctoral Positions

Position II.1. Postdoctoral Position *Leading the research group, mentoring the PhD student, Carbon nanotube – metal composites via sidewall functionalisation followed by reduction from method, characterization of the composites and optimization of the technological process.* PhD degree in chemistry, physics, material chemistry is required. Experience in carbon nanotube dispersion and functionalisation is a plus.

Position II.2. Engineer *Main responsibility will include the development of prototypes for the CNT-Metal as well as for CNT-Polymer cooling devices.* Successful candidate holds degree in physics, chemistry, material science, engineering or other related field with experience in.....

Position II.3. PhD student *Study of the thermal expansion (also construction of the measuring place) and thermal conductivity of metal compounds (latter under cooperation with III.2). Optimization of the carbon nanotube - metal composites for different area of application,* Position is opened for applicants with a basic education in physics, chemistry, material science or other related fields.

Group of Thermal Grease Development: PhD student and postdoctoral positions

Position III.2. Postdoctoral Position *in situ* polymerization of the natural oils, Thermal pastes optimization: viscosity, thermal conductivity. Prototyping. Skills required in the development of dispersion and functionalization of nanoparticles. Experience in polymerization is also highly desired.

Position III.2. PhD student Position thermal conductivity measurements, construction of the test apparatus, conductivity measurements of thermal pastes, modeling and experimental investigation of loading relations; Degree in physics is required for this position.

Successful candidates are expected to start their appointment in March 2009. English is the official language in the Lab. The salary for the posts will be based on the German university salary system.

The candidates may specify the research group that is most interesting for them. To apply, please submit the following documents in a single word or pdf file: 1) cover letter, including a statement of research interests; 2) curriculum vitae and a list of publications; 3) the names of research groups that you may be interested to work in 4) names and contact information of three referees. Applications should be addressed to the Professor Dr Stephanie Reich, and sent to format@physik.fu-berlin.de, **no later than February 28, 2009**. Informal enquiries can be made by telephone to Dr Datsyuk on +49 (0)30 838 52 155 or by e-mail to datsyuk@physik.fu-berlin.de