

Research Project

1. Title of the project	Laser-generated Polymer Nanocomposites for Water Purification	
2. Project partners/supervisors	Egypt	Germany
	Dr. Ahmed S. G. Khalil (FU/EGNC) Dr. Tarek A. GadAllah (NRC)	Prof. Dr. Stephan Barcikowski (UDE) Nina Million (UDE)
3. Profile of the master student	<ul style="list-style-type: none"> • Bachelor in Chemistry, Physics, Chemical Engineering, or Materials Science • Experience in practical working in the lab • Highly motivated and eager to learn • Follows the rules and guidelines set by the project partners 	
4. Duration of the project	12 months	
5. Work summary	<p>The project aims at the preparation of nanocomposite polymeric materials that exhibit high fouling resistance. These materials will be used in a later stage for the fabrication of membranes for water purification and desalination. Here, a laser ablation technique will be used to generate nanoparticles directly in polymeric solutions (see: http://www.uni-due.de/barcikowski and http://youtube.com/nanofunction). Gold as well as titanium nanoparticles will be tested in solutions of microgel. The preparation conditions will be optimized with the aim to produce nanoparticles that are well dispersed as well as stable in the desired microgels. The prepared polymer nanocomposites will be characterized by different techniques such as UV-Vis spectrometer, particle size analytics, scanning or transmission electron microscopy.</p>	
6. Funding and resources available to complete the project	At Fayoum University, electrospinning system used for the preparation of microfiltration membranes is available. In addition, a membrane casting tool for the preparation of ultrafiltration and nanofiltration membranes is available. UV-Vis spectrometer is also available. The other structural as well as surface characterizations are available at other labs in Egypt.	The German group is fully equipped with a number of laser ablation systems used for the fabrication of a wide range of nanoparticles with high yield. UV-Vis spectrometer and nanoparticle analytics are available. SEM as well TEM are available at analytical service facilities of UDE and can be used for the activities of the project.
7. General impact of the project	<ul style="list-style-type: none"> • Transfer the know-how on using laser ablation for the preparation of polymer nanocomposites. • New strategy for preparing titanium nanoparticles with tuned bandgap in microgel will be developed. • Functional and high fouling resistant membranes will be introduced in future. 	
8. Outlook of the project	<p>The proposed project will be the first step in a long-term and extensive project on using laser ablation for the preparation of nanocomposite for water purification as well as bio-applications. Within the frame of this project, a detailed and extended proposal for extra funding will be prepared and submitted to funding programs in Germany and Egypt.</p>	