

Template form for a master thesis project

1. Title of the project	Fabrication of advanced microfiltration membranes using electrospinning	
2. Project partners/supervisors	Egypt	Germany
	Prof. Mohamed Ismail Badawy Dr. Ahmed S. G. Khalil Dr. Tarek A. Gad-Allah	Prof. Mathias Ulbricht Prof. Stephan Barcikowski Dr. Thomas Bahnert (DTWN)
3. Profile of the master student	<ul style="list-style-type: none"> - B. Sc in Chemistry, Chemical Engineering, or Physics - Preferred: Experience in using water analytical tools, and interest in materials 	
4. Duration of the project	2 years	
5. Work summary	<p>The project will be mainly concerned with the fabrication of polyethersulfone (PES) microfiltration (MF) membranes using electrospinning method. These membranes will be used for removal by combination of size-based exclusion/capturing and adsorption of suspended submicrons particles and pollutants potentially occurring in water resources in Egypt.</p> <p>The preparation of high flux and low fouling PES MF membranes will be achieved through:</p> <ol style="list-style-type: none"> 1- Optimization of the preparation parameters such as PES concentration, humidity, flow rate, and voltage during the electrospinning process. 2- Incorporation of metal or metaloxide nanoparticles (e.g. silver, titania, ...) and/or different functional copolymers in the matrix of the membranes during the preparation of the electrospun nanofibers. <p>Water samples from different sites in Egypt and at different time intervals will be collected and analysed. The different functional MF membranes will be tested for removal of suspended particles and pollutants. The efficiency of the removal will be tested for extended time of continuous operation.</p>	
6. Funding and resources available to complete the project	<p>At NRC, all facilities for physico-chemical analysis of water/wastewater such TOC analyzer, UV/Visible spectrophotometer, gas chromatography equipped with mass spectrometer (GC/MS/MS) and high performance liquid chromatography are available.</p>	<p>At DTNW, electrospinning system is available. At UDE, characterization tools for rheological properties of PES solutions, surface and structural properties of membranes are available. In addition, silver nanoparticle dispersions prepared using laser ablation are available.</p>

7. General impact of the project	<ul style="list-style-type: none"> - Transfer of know-how on fabrication and characterization of membranes using electrospinning to Egyptian students. - Electrospinning system will be built at Fayoum University. The system will strongly support the research activities in this important area in Egypt. - Master student will acquire experience in preparation and characterization of membranes and filter materials - Master student will also acquire skills for the analysis of water samples. - Production of treated water complying with the Egyptian Code of Practice. - Protection of the environment and health of the people.
8. Outlook of the project	<p>The proposed project will be the first step in a long-term and extensive project on membrane engineering for different applications including water purification and desalination. Within the frame of this project, a detailed and extended proposal for funding will be prepared and submitted to funding programs in Germany and Egypt. The current project can be extended for other master research projects hosted by the involved partners.</p>