

Research Project

1. Title of the project	Ultrathin Reverse Osmosis Membranes by Layer by Layer Assembly	
2. Project partners/supervisors	Egypt	Germany
	Dr. Ahmed S. G. Khalil (FU/EGNC) Dr. Tarek A. GadAllah (NRC)	Prof. Dr. Mathias Ulbricht (UDE)
3. Profile of the master student	<ul style="list-style-type: none"> • Bachelor in Chemistry, Chemical Engineering, Materials Science or Pharmacy • 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 highly efficient polyamide (PA) thin film nanocomposite membranes used for water desalination. The layer by layer assembly will be utilized to fabricate ultrathin PA layer (below 50 nm) on different porous supports such as PAN, PES, and PS. The introduction of interlayer on top of the porous support will be decisive and will strongly influence the flux and the rejection of the prepared membrane. The surface as well the structural properties of the prepared membranes will be characterized using techniques such as FTIR, XPS, contact angle, Zeta potential, SEM, and TEM.</p>	
6. Funding and resources available to complete the project	<p>At Fayoum University, different systems used for preparation of ultrafiltration and RO membranes are available. Layer by Layer assembly can be used using custom setups. AFM is available at Egypt Nanotechnology Center. The other structural as well as surface characterizations are available at other labs in Egypt.</p>	<p>At UDE, characterization tools for surface, structural and transport properties of membranes such as FTIR, zeta potential, contact angle, permeability and SEM are available. Experimental setups needed for the preparation of membranes are also available.</p>
7. General impact of the project	<ul style="list-style-type: none"> • Transfer the know-how on using layer by layer assembly for the preparation of polymer nanocomposites membranes. • New strategy for preparing ultrathin PA membranes will be developed. • Functional and high fouling resistant membranes will be introduced. 	
8. Outlook of the project	<p>The proposed project will be part of the existing collaboration between the German and the Egyptian partners on the development of efficient polymeric membranes used for water purification and desalination. 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/or Egypt.</p>	