Lucie Vobecka, J Membra Sci Technol 2017, 7:2 (Suppl)
DOI: 10.4172/2155-9589-C1-003

## Swelling of heterogeneous ion-exchange membranes analyzed by micro-computed tomography

**Lucie Vobecka**
University of Chemistry and Technology, Czech Republic

Heterogeneous ion-exchange membranes are a type of ion-exchange medium that incorporates several functional components. These components are ion-exchange resin particles, polymeric binder and polymeric fibers. Each of the components provides either required functionality or mechanical support so that the membranes can be efficiently used in industrial electro-separation units. One usually prepares such membranes by blending finely ground resin particles and polymeric pellets followed by their heating and laminating in between two layers of polymeric fibers. This technology enables high-scale production of these membranes; however, their structure is entirely random without any possibility for its control. To study the effect of surface and volume heterogeneities of these membranes on their behavior and performance, we started to analyze small samples of membranes by micro computed tomography (μCT). μCT is a technique that uses X-rays to "look inside" materials and nontransparent systems. In case there are multiple components (phases) present, having different attenuation properties towards the transmitted X-ray, μCT can yield complete structural analysis of the investigated systems. In this work, we study heterogeneous ion-exchange membranes that are analyzed in dry and then swollen state after immersion into KCl solutions of various concentrations. First, segmentation of obtained raw data is carried out followed by the analysis of the actual composition of the membranes and related changes caused by the swelling or shrinking of the membranes in different KCl solutions. In this contribution, we will present our experimental set up for analysis of wet samples by μCT and selected experimental results followed by discussion of the observed structural changes of the membranes.

### Biography

Lucie Vobecka received her PhD degree in Chemical Engineering from the University of Chemistry and Technology, Prague, Czech Republic, in 2015. Her PhD thesis was drawn up at the Institute of Chemical Process Fundamentals, Czech Academy of Sciences, Prague. She is currently a Post-doctoral Fellow in the Department of Chemical Engineering, University of Chemistry and Technology, Prague. Her research areas include surface and interfacial phenomena in liquid–liquid or gas–liquid systems and behavior of heterogeneous ion-exchange membranes in DC electric field.

lucie.vobecka@vscht.cz

Notes: