

**Investigations on the conditions of preparation and modification of non-porous polymeric membranes, resulting in the novel materials with enhanced transport and selective properties applied for the pervaporative separation of liquid mixtures**

Nowadays liquid organic solvent are separated by classical distillation process. However, the separation of azeotrope, isomers, and close boiling liquids is complicated. Distillation is also energy intensive technique. Membrane techniques are regarded as an alternative way in separation of various mixtures. Membrane is a barrier separating two phases, through which at least one mixtures component is preferentially transported. Pervaporation (PV) is membrane technique used for separation of organic liquid solvents. Dense, non-porous membranes are used in PV and driving force of transport is created by different pressure for the feed and permeate side.

The main goal of the project is a preparation membranes with better transport and selective properties, used in separations of organic solvent mixtures and evaluation the effect of water presence on the pervaporation process efficiency.

Currently, the most inspiring and challenging area of research in pervaporation area is an organic-organic separation. This fact results from the similar physicochemical nature of the separated components and the necessity of membranes selection with different character for each pair of separated components. Separation of organic-organic mixtures for industrial application is still challenging as distillation is regarded as an expensive separation technique, especially when applied for separation mixtures forming of azeotropes and close-boiling mixtures. The challenge for the further development of organic-organic pervaporation is also the performance of membranes stable at harsh conditions. The need for the development new materials, which exhibited high selectivity in separation process is obvious.

Membrane modifications is a process leading to obtain novel membranes with desire properties. Authors of the presented project propose modification by selected nanoparticles fillers (preparation of "mixed matrix membrane"). Membrane with different phobicity: based on hydrophobic (polydimethylsiloxane - PDMS and polyether block amide - PEBA) and hydrophilic (polyvinyl alcohol - PVA) polymers will be performed and evaluated.

Prepared membranes will be analyse using various analytical methods: (e.g. Nuclear Magnetic Resonance Spectroscopy, Atomic Force Microscopy). Transport and selective properties of membranes will be also determined in organic-organic pervaporation. Results of this research will be used in Ph.D. thesis of project leader. Research realized in the frame of this project possesses an element of novelty and will contribute to broaden the current state of knowledge in organic-organic pervaporation.