

## SUMMARY

The development of electrical power generation (water demineralisation), production of fresh water (Reverse Osmosis), geothermal energy, oil and shale gas (fracturing and processing water) and the global expansion of maritime transport (bilge water) and many other technologies generating saline wastewaters cause environmental degradation due to discharge of salts into the environment. A high concentration of salt and oil in the wastewaters prevents their biological purification and the wastewater treatment plants do not treat this kind of wastewater, which enhances a risk of illegal discharge into the environmental. Membrane processes, such as membrane distillation, can effectively treat these wastewaters, but the major problem constitutes the durability of hydrophobic membranes, particularly during the treatment of brines containing various surface-active contaminants (e.g. oils and surfactants). Unfortunately, the high salts concentration increased the scaling intensity, which additionally restricted the oily wastewater treatment by application of membrane contactors. Therefore for this kind of feed, the new composite hydrophilic/hydrophobic membranes or membranes with amphiphobic surfaces were proposed for water desalination. Unfortunately, the possibility of application of these new types of membranes was supported by desalination tests carried out generally below 10-50 h, which strongly restricted their implementation in the industrial installations.

The aim of the research planed in this project is obtain the membrane resistance on the wettability by separated oily wastewaters, which creates the possibility of implementation these membranes in industrial installations. A perspective results for membrane contactors were obtained when the capillary polypropylene (PP) membranes were used. In short-time studies was revealed the resistance of PP membranes for oily wastewaters. In this project this will be confirmed by long-term studies using membrane distillation (MD) and natural membrane evaporation (NME) for separation oily wastewaters (standards and actual - different compositions). The anti-wetting protection by surface hydrophilization (plasma treatment) and covering the membranes by braid net will be also studied.

A membrane morphology and composition of deposits formed on the membrane surface will be analyzed by the scanning electron microscope (SEM-EDS), AFM microscope and by ATR-FTIR apparatus. The studies of oil droplet size distribution, surface tension, zeta potential and the contact angle will be carried out to determine the effects proceed in membrane and concentrated feed. The composition of solution will be analyzed using IC and HPLC chromatographs and ICP-AES spectrophotometer. The oil content will be analyzed by OCMA analyzer (Horiba).

The results of performed studies will be published in the international journals with high impact factor. The participation in both the domestic and international scientific conferences for presentation of research results will be also included.