# POLITECHNIKA ŚLĄSKA

## WYDZIAŁ INŻYNIERII ŚRODOWISKA I ENERGETYKI

### ZAKŁAD CHEMII ŚRODOWISKA I PROCESÓW MEMBRANOWYCH



# EKOLOGICZNE ZAGOSPODAROWANIE GNOJOWICY Z WYKORZYSTANIEM TECHNIK MEMBRANOWYCH

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# Ecological utilization of slurry with the use of membrane techniques

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Ph.D. thesis abstract

High density livestock farming results in the production of huge amounts of slurry which requires special utilization methods. Nowadays applied solutions are not enough sufficient for complete utilization of the produced slurry. According to the high water content i.e. above 95% it can be treated as its source. Such an assumption can be fulfilled when low- and high pressure driven membrane processes are applied.

The aim of the study was to determine the possibility of water recovery from pig slurry with the use of single stage low pressure filtration (micro- or ultrafiltration) and two-stage high pressure filtration (nanofiltration and reverse osmosis). The studies were carried out in the laboratory scale with the use of polymeric membranes and in the pilot scale with the use of ceramic membranes. The feed to the filtration was prepared with the natural separation processes i.e. sedimentation/flotation, filtration or centrifugation. Membrane processes were carried out at various transmembrane pressure and their capacity, filtrates parameters and impact of accompanying phenomena i.e. fouling and concentration polarization were determined.

The studies revealed that the application of membrane processes enables the water recovery from the slurry of the quality proper for its reuse on farm. The best results were obtained for the system in which preliminary treatment via centrifugation, ultrafiltration with the use of polymeric membranes of cut off 10 kDa and two-stage reverse osmosis were used.