



## Preparation of low-cost microfiltration membranes from fly ash

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Received 11 August 2013; Accepted 2 October 2013

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### ABSTRACT

Commercial ceramic membranes have undergone a rapid growth during the last two decades. The interest in ceramic membranes has increased concurrently with new processes and applications. The development of membrane processes to treat wastewater is generally limited as the membranes especially the inorganic ones are highly expensive. The present work deals with the fabrication and characterization of ceramic membranes using cheaper raw materials. Disk type ceramic membranes were prepared using fly ash as the major constituent without using any polymeric additives. The membranes were sintered at four different temperatures (800, 850, 900 and 1,000°C) to study the effect of sintering temperature on membrane properties. The membranes were characterized by thermo-gravimetric analysis, scanning electron microscopy and X-ray diffraction techniques and the porosity was determined gravimetrically. The prepared membranes had a porosity of 35–40%, average pore size of 1.2–2.3 µm and exhibited very good chemical stability in acidic as well as basic solutions. The SEM pictures indicated that the membranes were defect-free. The pure water permeability of the membranes varied from 1,234 to 5,566 L/(m<sup>2</sup> h bar). In comparison with other membranes, the membranes sintered at 900°C had a uniform pore size distribution with an average pore diameter of 1.2 µm. Flux decline profiles for the separation of oil-in-water were obtained and maximum oil rejection of 99.2% was obtained for the membrane sintered at 900°C which indicates that the membranes made of fly ash are useful for microfiltration applications.

*Keywords:* Fly ash; Low cost; Ceramic membrane; Microfiltration; Sintering temperature

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