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Bio-based ceramic membranes used for water disinfection

Abstract:

Bio-based ceramic membranes were elaborated from kaolinite clays, coconut husks and eggshells to retain *E. coli* bacteria present in water intended for human consumption. Their characterization and removal performances are investigated in this work. These bio-ceramic membranes were obtained by heating the formulation containing clay, coconut husk and eggshell at 900 °C and 1000 °C, at different temperature rates, to give S1, S2 and S3 materials. Thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), mercury porosimetry and scanning electron microscopy (SEM) were used to characterize these membranes. Water flux density, bacterial removal and biofouling were also assessed. Water flux density was shown to depend on material porosity. Bacteria retention was 90% (with 1 log-removal) for S1, 80% (with 0.7 log-removal) for S2 and 100% (with 3.3 log-removal) for S3. Membranes S1 and S2 presented reversible biofouling, while no fouling was evidenced for S3 in the tested conditions. This work shows that the best bio-ceramic membrane in terms of bacterial removal and flux density was S3. Its water flux density was 2123 L/h/m² at an initial pressure of 0.2 bar. This material is particularly interesting because its production protocol is quite simple, fast and without the addition of chemical additives. Moreover, it can be used to efficiently remove bacteria from drinking water.

Biography

Pelagie Kamgang Syapnjeu has completed his PhD at the age of 34 years from University of Yaounde 1-Cameroon/European Institute of Membrane, Montpellier-France. She has published 03 papers in reputed journals