

Hydrophobic mullite ceramic hollow fibre membrane (Hy-MHFM) for seawater desalination via direct contact membrane distillation (DCMD)

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ABSTRACT

A low-cost hydrophobic mullite hollow fibre membrane (Hy-MHFM) fabricated via phase inversion/sintering technique followed by fluoroalkyl silane (FAS) grafting is presented in this study. The prepared CHFMs were characterized before and after the grafting step using different characterization techniques. The pore size of the CHFMs surface was also determined using ImageJ software. The desalination performance of the grafted membrane was evaluated in direct contact membrane distillation (DCMD) using synthetic seawater of varying salt concentrations for 2 h at various feedwater temperatures. The outcome of the evaluations showed declines in the permeate flux of the membrane at increasing feed concentration, as well as increased flux with increased feed temperature. The long-term stability of the membrane was achieved at time 20 h, feed temperature 60 °C, and permeate temperature 10 °C, the membrane achieved a salt rejection performance of about 99.99 % and a water flux value of 22.51 kg/ m² h.

KEYWORDS

Mullite; Ceramic membrane; Direct contact membrane distillation; Seawater desalination; Hydrophobic membrane

ACKNOWLEDGMENTS

The authors gratefully acknowledge the financial supports from the Ministry of Higher Education Malaysia under the Fundamental Research Grant Scheme (Project Number: R.J130000.7809.5F161), Malaysia Research University Network (MRUN) Grant (Project Number: R.J130000.7809.4L867) and Higher Institution Centre of Excellence Scheme (Project Number: R.J090301.7809.4J430), Ministry of Science, Technology and Innovation (MOSTI), Malaysia under International Collaboration Fund (ICF) (Project Number: IF0120I1164), and Universiti Teknologi Malaysia under the UTM High Impact Research Grant (Project number: Q.J130000.2409.08G34) and Collaborative Research Grant (CRG) (Project number: R.J130000.7351.4B440).