



Aalborg Universitet

AALBORG UNIVERSITY
DENMARK

Development of nanoporous TiO₂ and SiC membranes for membrane filtration

König, Katja; Vigna, Erika; Farsi, Ali; Boffa, Vittorio; Christensen, Morten Lykkegaard; Yue, Yuanzheng

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

König, K., Vigna, E., Farsi, A., Boffa, V., Christensen, M. L., & Yue, Y. (2012). *Development of nanoporous TiO₂ and SiC membranes for membrane filtration*. Abstract from Nordic Conference on Ceramic and Glass Technology, Roskilde, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- ? Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- ? You may not further distribute the material or use it for any profit-making activity or commercial gain
- ? You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Development of nanoporous TiO₂ and SiC membranes for membrane filtration

Katja König, Erika Vigna, Ali Farsi, Vittorio Boffa, Morten L. Christensen, Yuanzheng Yue

Section of Chemistry, Aalborg University, DK-9000 Aalborg, Denmark

kak@bio.aau.dk

Reverse osmosis membranes are increasingly used for the production of drinking water (desalination of sea water or brackish water), for demineralisation of water in industrial processes (boiled feed water, microelectronics production) as well as in food processing and pharmaceutical production. Today's reverse osmosis membranes are made of polymers; however, these membranes have several technical limitations, for example, low water fluxes and high sensitivity to oxidizing chemicals. Since membrane fouling is still a major problem in reverse osmosis desalination plants, replacement of polymer reverse osmosis membranes by ceramic counterparts would provide higher fluxes and allow more efficient cleaning of the membranes.

The aim of this work was to prepare defect-free nanoporous ceramic (TiO₂ and SiC) layers on macroporous SiC supports by using electrophoretic deposition and dip-coating. Ceramic powder was dispersed in water and in ethanol, and to increase absolute value of zeta-potential of the particles, different deflocculants (hexadecyltrimethylammonium bromide, polyethylene imine) were added. In parallel, SiC layers were prepared by dip-coating of suspensions containing pre-ceramic polymer allyl-hydridopolycarbosilane dissolved in hexane with addition of submicron SiC particles. In all the cases, after coating step, the layers were dried and heat treated under different conditions. Results show that particle size distribution and thickness of the coatings play an important role in formation of defects. The number of defects decreased with decreasing thickness of the coatings. Furthermore, coatings composed of a mixture of nanosized and submicron SiC powder were more homogeneous than the coatings composed only of nanosized SiC powders. In comparison to conventionally sintered SiC coatings, polymer derived SiC coatings were much better adhered to the surface of macroporous SiC supports.