

Executive summary

Interim report

Removal of particulate matter by ceramic membranes during surface water treatment

Introduction

Micro- and ultrafiltration membrane applications for particle removal have been rapidly increased in public drinking water supplies in recent years. Among numerous innovations in this sector ceramic membranes are attracting an increasing interest. Ceramic membranes are considered as resistant to mechanical, chemical and thermal stress. A high porosity and a hydrophilic surface are additional advantages which may open various fields for applications in water treatment including the direct treatment of surface waters.

Importance

Direct treatment of surface water is one important step of drinking water production. Application of ceramic membranes could lead to a more efficient and reliable technology. Higher fluxes of ceramic membranes compared to polymeric membranes allow a more compact plant design. Robustness of ceramic membranes will provide confidence regarding different aspects, including membrane integrity, life time and durability against cleaning agents. Ceramic membranes allow the development of new cleaning and hybrid processes in future.

Approach

The objective of this study is to identify advantages and disadvantages of ceramic membranes compared to existing polymeric membranes to remove particles from surface water drinking water treatment. The focus was set to examine the influence of membrane pore size and membrane material on operation and on removal of nanoparticles and phages. Moreover, alternative cleaning methods for ceramic membranes were tested.

Result

Available results indicated that SiC/SiO₂ membranes seem to initiate a similar increase of total membrane resistance during filtration of dam water compared to Al₂O₃ membranes. Fouling mechanisms of ceramic and polymeric membranes were found to be different, resulting in lower total membrane resistances for ceramic membranes during filtration of dam water. Ozone could be a promising alternative method for CIP or CEB of ceramic membranes fouled with organic substances as results of preliminary tests showed. MS2-phages were removed by ceramic ultrafiltration membranes without dosing a flocculant with an efficiency of about 2 log for 50 nm pore size membranes and about 3 log for 10 nm pore size membranes

More information

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