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Abstract submission

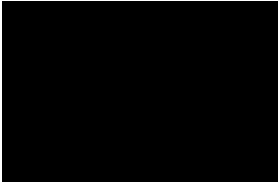
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Self-Cleaning BCTZ-Based Piezoelectric Porous Ceramic Membranes for Advanced Microfiltration: A New Strategy for Fouling Control

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Microfiltration (MF) membranes are a key technology for water recovery from agro-food wastewater, but their performance is strongly limited by fouling, which reduces permeability and operating life. Ceramic membranes (CMs) outperform polymeric ones in chemical stability, mechanical strength, and longevity, yet their high cost requires strategies to improve antifouling efficiency. Among CMs, self-cleaning piezoelectric membranes are emerging as a new solution, where mechanical vibrations generated under electric field promote impurity detachment and surface regeneration. Within the SELWA project (funded by the European Union – Next Generation EU – Grant Assignment Decree No. 20229PNWM7), porous lead-free (Ba,Ca)(Zr,Ti)O₃ (BCTZ) membranes are developed through sacrificial



template methods, freeze casting, and binder jetting. This work presents the first results on the correlation between microstructure, piezoelectric properties, and self-cleaning behaviour. The challenges of transitioning from dense to porous architectures are discussed, together with preliminary water permeability and filtration tests that demonstrate the potential of piezoelectric ceramics as a new strategy for fouling control in advanced MF processes.

