

Smart AAO membranes with dual responsiveness

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Stimulus-responsive membranes have gained a strong attraction due to their potential use for through the control of pore sizes of the membranes.

However, the release rate depends on only a single stimulus (for instance, temperature, PH). However, when the pore sizes in top and bottom of the membranes are independently adjusted by different stimuli, the membrane could play as a specific reactor (or container) with two independent gates.

Here, we fabricate the dual stimuli-responsive anodized aluminum oxide (AAO) membranes by modifications of both pores with different surface functionalities. For this purpose, the wall of the pores in the top regions of the membranes are grafted with poly (N-isopropylacrylamide) chains, which allows us to actuate the pore size by temperature. On the other hand, the wall of the pores in the bottom regions are grafted with poly(acrylic acid) chains; thus the pore size is actuated by PH.