

Ag Nanoparticles Coated 3-D Inverse Opal Structures as Highly Efficient Catalytic Membrane Assisted by Mussel-Inspired Polydopamine Modification

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Extensive studies have been reported for functionalizing polymer-based 3D inverse opal (IO) structures for various applications including optics, piezoelectric devices, and environmental separation. However, attaining this purpose is still challengeable due to the limited diffusion of waterborne precursor for functionalization inside the intrinsically hydrophobic IO structures. To overcome this limitation, we demonstrated a simple method of polydopamine (PD) and silver nitrate dip-coating for functionalizing polymeric IO structures for catalytic membranes. This facile PD coating offers particular advantages of not only improving the hydrophilicity of the IO structure for easy infiltration of precursor, but also creating nucleation sites for the reduction of Ag NPs. As a result, combination of reactive Ag NPs with enhanced surface area of IO-structured support yielded remarkable catalytic membrane performance without sacrificing high flux characteristic under optimized condition.