Engineering of nanomaterials and interfaces for water treatment applications

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The most fundamental phenomena on the nanostructured membrane for energy, environmental and health applications are the control of interfaces. The performance of all those nanostructured membranes and devices can be improved or controlled by the enhanced geometric area of the nanostructured interfaces. In this respect, an accurate control of the geometry (size, porosity etc.) and interfaces is primordial to finding the delicate balance between large/control interface areas and efficient transport conditions.

Here, we used different synthesis techniques such as atomic layer deposition (ALD), electrospinning, electrodeposition, 2D materials etc. as the main tools for the creation of controlled nanostructured interfaces in which the geometry can be tuned accurately and the dependence of the physical-chemical properties on the geometric parameters can be studied systematically in order to design nanostructured membrane with controlled interfaces. We will show examples of how these methods can be used to create membrane[1] for water treatment (by photocatlytic[2,3] or electrofenton reaction[4,5,6]) as well as membrane for osmotic energy[6] in which the performance varies with the nanostructure morphologies and interfaces.

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