Reactive retention of heavy metals using self-indicator polymeric membranes

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Abstract

Heavy metals are some of the most hazardous environmental contaminants as they can be found widely in the Earth's crust and affect all ecosystem components such as water, soil and even air. They can enter easily into the human body and represent a health hazard even at very low concentrations. Considering this, various technologies were developed for the removal or immobilization of heavy metals commonly found in water and wastewater. These remediation procedures include precipitation and coagulation, ion exchange, membrane filtration, bioremediation, heterogeneous photocatalysis and adsorption. Membrane separation processes occupy a central place in the development of green technologies since they are more efficient and economical in time and energy. The main advantages of membrane processes consist in their increased selectivity and high separation capacity. Membrane selectivity as well as the retention capacity are evaluated through specific techniques which ultimately appraise the membrane efficiency (percentage of species dissolved or dispersed in the feed solution which are retained by the membrane).
The aim of the current project is to synthesize novel polymeric membranes with self-indicating properties that simultaneously exhibit two roles: the efficient removal of heavy metals from real water samples and also provides a visual indication of the separation capacity without subsequent analysis, through a color change of the membrane's surface. These modified membranes will thus be able to retain heavy metal cations.

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