BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA

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"Tuning magnetic nanosorbents for environmental remediation"

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Many emerging pollutants (also known as micropollutants), including pesticides, drugs, heavy metals, hormones, pharmaceuticals and personal hygiene products have often been detected in surface water, soil and drinking water, in alarming concentrations. In this direction, several techniques of decontamination or environmental remediation have been used, among them the adsorption, the most effective and the most employed. The last trend is the use of nanostructured adsorbents, since they present greater surface / mass ratio that can be translated in greater removal efficiency. Particularly, the adsorbent is introduced into the water containing the contaminants, which are readily adsorbed and, after separation of the adsorbate by sedimentation and / or filtration, the pollutant is degraded/removed in situ. However, as in most processes using nanostructured materials, it is difficult to recover the nanosorbents, mainly due to the high dispersivity, low density and infiltrability, making it difficult to reuse them. In this aspect, nanosorbents associated with magnetic nanomaterials have been extensively investigated - this combination allows the adsorbent to be manipulated by the application of an external magnetic field, enabling to magnetically directing, separating and recovering the nanomaterials impregnated with the pollutants and, after removing the contaminants, reusing the modified nanomagnets in several cycles. In the scope of the remediation, magnetic nanoparticles (NPMs) of iron oxides are the most applied, due to their low toxicity, high magnetization and surface reactivity, besides numerous possible routes of synthesis to obtain them. Thus, in this presentation we show perspectives to enhance the performance of magnetic nanosorbents based on iron oxide MNPs for environmental applications. A special attention is given to the synthesis and functionalization steps of different nanosorbents as well as to the interpretation of the adsorptive behavior of various pollutants.

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