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Protein adsorption from aqueous solution by alumina supports: A new process for enzyme recovery and reuse

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Enzymes are the biocatalysts of the living world, but their properties render them also exploitable in many applications that range from industrial catalysis to therapeutics, including synthetic and pharmaceutical chemistry, wastewater bioremediation, fabrication of high performance biosensors, among others. The use of enzymes, however, is limited by their recovery since this aspect plays a significant role in the evaluation of the cost of the biocatalytic processes, therefore several methods have been proposed for their immobilization on stable supports. This study investigates the possibility of using different phases of nano-alumina for enzyme capture and reuse. Alumina nanoparticles were synthesized in the γ and δ-θ phases with different shapes starting from boehmite and dawsonite thermally calcined at 500 and 1000°C respectively and tested as adsorbent of commercial soybean peroxidase. The alumina samples were characterized by thermogravimetric analysis, specific surface area, X-ray powder diffraction, scanning electron microscopy, zeta-potential and Fourier transform infrared spectroscopy. The kinetic of recovery was evaluated in different experimental conditions (enzyme dosage, pH, temperature and presence of buffer) indicating that the supports can easily capture the enzyme which can be almost completely released for a subsequent cycle of reaction.

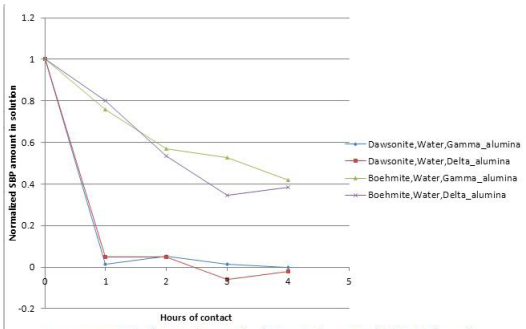

Figure1: UV-Vis results showing adsorption of soybean peroxidase in water by different phases of alumina from dawsonite and boehmite.

Biography

Razieh Sadraei is a PhD student in Chemical and Material Science at the University of Turin, Italy. She is working on immobilization of protein onto different inorganic supports and their applications in water treatment. She found a new pathway for recovering enzyme by adsorption and desorption processes. She has expertise in working with some instruments including spectroscopy (FTIR-ATR, UV/Vis, OES), diffractrometry (XRD), zetta potential (DLS), calorimetry and thermo-gravimetric (TGA) and surface analysis (DSA). She is a reviewer for *International Journal of Biology* (IJB) and *Journal of Food Research* (JFR). Her fields of interest are Biotechnology and Nanochemistry.

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