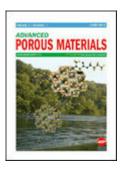
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## Fabrication of Nanobiocatalyst for Biomimetic CO<sub>2</sub> Sequestration

Authors: Shamna, I.; Chandran, Mijun; Anusha, A.; Jeong, Soon Kwan; Bhagiyalakshmi, Margandan Source: Advanced Porous Materials, Volume 6, Number 1, June 2018, pp. 49-55(7) Publisher: American Scientific Publishers DOI: https://doi.org/10.1166/apm.2018.1150

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Abstract	References	Citations	Supplementary Data	Article Media	Metrics					
functional amine, oc confineme potential was inves CAAuNps- temperatu effect of r retained a hydration was evalu SEM which immobiliz	lized mesoporo ta(aminopheny ent of gold name analysis. Carbo tigated by para- 8 for <i>p</i> -NPA hyd ure, storage sta eusability and s at about 85% af of CO <sub>2</sub> and its ated through the h revealed the f ed on AuNps-3	ous SBA-15. C I)silsesquioxa oparticles an nic anhydras -nitrophenyl drolysis were bility, and re- storage stabil ter 20 cycles sequestration te amount of ormation of and AuNps-	Drganic amine, Tris(2-am ane (HA) with 3 and 8 an d characterized by XRD, e was immobilized over acetate ( <i>p</i> -NPA) hydrolys e 1660, 1593 and 1637 M usability was also evalua lity of CAAuNps-8, illustra and 89% after 20 days r n as CaCO <sub>3</sub> was studied f CaCO <sub>3</sub> precipitated. Pre Calcite CaCO <sub>3</sub> . The resul 8 was reusable and stab	In this study, Carbonic anhydrase (CA) was immobilized over gold nanoparticles confined to amine- functionalized mesoporous SBA-15. Organic amine, Tris(2-aminoethyl)amine (OA), and organic–inorganic hybrid amine, octa(aminophenyl)silsesquioxane (HA) with 3 and 8 amine groups were grafted over SBA-15 for confinement of gold nanoparticles and characterized by XRD, N <sub>2</sub> adsorption/desorption isotherm and zeta potential analysis. Carbonic anhydrase was immobilized over AuNps-3 and AuNps-8 and its catalytic activity was investigated by para-nitrophenyl acetate ( <i>p</i> -NPA) hydrolysis. The Kcat/Km values of free CA, CAAuNps-3 and CAAuNps-8 for <i>p</i> -NPA hydrolysis were 1660, 1593 and 1637 M <sup>-1</sup> s <sup>-1</sup> , respectively. The influence of pH, temperature, storage stability, and reusability was also evaluated for above nanobiocatalyst. The study on effect of reusability and storage stability of CAAuNps-8, illustrated that the activity of Au-conjugated CA was retained at about 85% after 20 cycles and 89% after 20 days respectively, with that of its initial activity. Further, hydration of CO <sub>2</sub> and its sequestration as CaCO <sub>3</sub> was studied by nanobiocatalyst and the carbonation capacity was evaluated through the amount of CaCO <sub>3</sub> precipitated. Precipitated CaCO <sub>3</sub> was characterized by XRD and SEM which revealed the formation of Calcite CaCO <sub>3</sub> . The results of above study substantiated that CA immobilized on AuNps-3 and AuNps-8 was reusable and stable under storage conditions. Hence, this nano- biomaterial is an eco-friendly catalyst for the capture and sequestration of CO <sub>2</sub> .						

Keywords: CARBONIC ANHYDRASE; CO2 SEQUESTRATION; GOLD NANOPARTICLES; IMMOBILIZATION; SBA-15

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