



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: **Amine functionalized ordered mesoporous silica materials and its applications towards adsorbent and membrane for CO₂ capture**

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SHORT ABSTRACT

The main aim of this work is to study the CO₂ separation using amine functionalized ordered mesoporous silica materials in adsorption based technology as well as membrane based technology. To know the inner detail of surface characteristics and the CO₂ adsorption capacities of the amine-functionalized ordered mesoporous silica materials, the powder form of the materials were studied. Functionalization of the ordered mesoporous silica (MCM 48) materials with different amines was performed by using three different amines. The best result for CO₂ adsorption of amine-functionalized amine was chosen for further analysis. The CO₂ adsorption capacity at a particular temperature for different dosing of amine-functionalized OMS material was studied. In addition to this, the temperature effect of the amine-functionalized OMS materials which showed best CO₂ adsorption capacity, were also studied. After inheriting the concept of amine-functionalized ordered mesoporous silica materials for CO₂ adsorption, we analysed two different techniques to synthesize OMS materials and compared them for CO₂ uptake capacity. Then the OMS materials were introduced in more energy saving membrane application. The ordered mesoporous silica membrane was successfully synthesized on porous α -alumina support. Finally, performance studies were investigated and analysed by using single and binary gas mixture (CO₂/N₂).