

## DocMASE Project Proposal 2012-09

Project Title	<b><i>Mesoporous structures for catalysis and drug delivery</i></b>
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Second Univ. and Advisor	<b>Universitat Politècnica de Catalunya</b> (Barcelona, SPAIN) Prof. Maria Pau GINEBRA
Associated Partner(s)	
Project Description	<p>Mesoporous materials are materials with cavities (pores) in the size range of 2 to 50 nm. These materials are interesting for a variety of applications, such as catalysis, drug delivery systems, energy storage, and nanoparticle fabrication. In this project, mesoporous silica with different pore sizes will be synthesized. Catalytic properties of the mesoporous silica will be tested with and without nanoparticles present in the pores. The catalytic study will be performed in a lab-scale high pressure reactor. The reaction to be studied is when carbon dioxide reacts with hydrogen to form methanol, which has implications on how to handle the global fossil fuel and CO<sub>2</sub> problem. The key points are to understand the role of the catalyst in the reaction and to study the kinetics of infiltration and release of different substances. The latter has a strong link to the use of mesoporous structures as a drug delivery systems. The work related to synthesis and catalysis will be performed at Linköping University in Sweden and the infiltration kinetic studies will be performed at Universitat Politècnica de Catalunya in Spain.</p>
References and Previous Publications	<p>E.M. Johansson et al. "Rapid synthesis of SBA-15 rods with variable length, widths and tunable large pores" <i>Langmuir</i> <b>27</b>, 4994-4999 (2011).</p> <p>M.A. Ballem et al. "Influence of synthesis temperature on morphology of SBA-16 mesoporous material with a three-dimensional pore system" <i>Micro. Mesoporous Mater.</i> <b>129</b>, 106-111 (2010).</p>