CO₂ SELECTIVE POROUS CERAMIC MEMBRANES FOR CO₂ CAPTURE IN FOSSIL FUEL POWER GENERATION

The object of this project is to contribute to the development of efficient CO₂ capture technology in relation to fossil fuel power plants. Semi permeable ceramic membranes consisting of a thin layer porous adsorptive material supported by a porous substrate could be a method for the separation of CO₂ from flue gas. In this process CO₂ adsorbs selectively within the pores of the adsorptive top layer and diffuse through the membrane by surface diffusion mechanism.

This project will focus on a new process for the preparation of a high temperature CO₂ perm-selective porous ceramic membrane and its possible application for integration in power generation with CO₂ capture.

The preparation route of membrane is based on filtration of flame generated nano-particles directly from the hot gas phase onto porous substrate surface in a one step process (Fig.). The principle behind flame synthesis of nano particles is the burning of metal precursors (organic components of metals) in a flame reactor leading the formation of powders by a gas to particle conversion process.

Membranes with ultra thin layer and small pore size without any cracks or defects have been already produced by flame deposition method. The project will include experimental as well as theoretical studies on:

- Selection of optimum membrane materials with high affinity for CO₂ adsorption.
- Controlling particle morphology and crystalline structure of generated powders.
- Controlling thickness, porosity and structure of generated membrane top layer.
- Experimental measurement of permeability and selectivity.