

Project Information



Subject: Membrane technology in the periphery of fuel cell vehicles

Applicant: Department of Chemical Engineering
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Project Duration: 01.05.2002 – 31.12.2004

Project Partners: DaimlerChrysler
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Description of Project:

Fuel cell systems for mobile and stationary applications consist of numerous peripheral components. For separation requirements in this periphery, many membrane processes have already become state of the art, others are considered as important medium-term alternatives to already established technology. The three main areas in which membrane technology in fuel cell systems can be applied are

- reformate gas conditioning with metal membranes,
- water recovery with humidity exchange membranes
- oxygen enrichment of the cathode air.

The project aims at improving components concepts relevant to membrane processes in fuel cell systems. Research work includes the characterisation of different membrane materials by permeability and sorption measurements, the development of an innovative metal membrane reactor and steady-state and dynamic simulations of membrane modules with AspenPlus® / FORTRAN and Matlab® / Simulink®. Two of the most important advantages of fuel cell systems using a metal membrane reactor are the more compact construction and an improved hydrogen yield. The developments in the area of water management focus on more efficient water vapour recovery by means of new membrane materials and module constructions. Using improved membranes, the oxygen enrichment of cathode air foretells less heat production and a more efficient mode of operation of the fuel cell as a whole.