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Faculty of Geotechnical
Sciences and Environmental
Management

Bachelor's Thesis

**Computational Studies for CO₂ Capture in Microstructured
Membrane Reactors**

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Limassol, May 2021

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DEPARTMENT OF CHEMICAL ENGINEERING

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ABSTRACT

Carbon dioxide (CO₂) is one of the major atmospheric greenhouse gases. The continuous increase of CO₂ concentration and its long atmospheric lifetime may cause long-term negative effects on the climate. It is important to develop technologies in order to capture and minimize those emissions into the atmosphere. The objective of this work is to design and study theoretically a microstructured reactor in order to be used as a capture system. This work focuses on the geometrical parameters that affect the uniform flow distribution in a microreactor. The flow distribution was firstly tested on 2D simulations and then the results were approved by 3D CFD models. Moreover, in order to maximize the throughput of the system, four parallel microplates were used where even flow distribution was achieved into each layer of the microreactor.

Keywords: CO₂ capture, microreactors, uniform flow distribution, CFD simulations, numbering-up microreactor.