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# Modeling and Simulation of Electrochemical Cells under Applied Voltage

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## Abstract

The behavior of an electrochemical thin film under input voltage (potentiostatic) conditions is numerically investigated. Thin films are used in micro-batteries and proton-exchange-membrane fuel cells: these devices are expected to play a significant role in the next generation energy systems for use in vehicles as a replacement to combustion engines. The electrochemical investigation of thin films is a relevant topic for a wide range of applications such as hydrogels, ionic polymer metal composites, biological membranes and treatment of tumors.

In this work, a continuum-based model is presented in order to describe the behavior of thin membranes. The electrochemical behavior of thin membranes is usually hard to investigate with experiments. Therefore, numerical simulations are carried out in order to enable a greater understanding of the chemical reactions occurring within microscopic regions at the

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