

Numerical analysis on solid oxide electrolysis cell with graded electrode

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A two-dimensional model is developed to investigate the effect of graded electrode in solid oxide electrolysis cell (SOEC). The SOEC is attractive device for producing hydrogen without noble catalysts, and it could have more electrical efficiency than low temperature electrolysis. In the SOEC, electrochemical reaction takes place in the electrode and causes overpotential losses which depend on activation, ohmic resistance and diffusion limit. The microstructure of electrode affects the performance of SOEC as it is related to active site and porosity. In order to study the advantage of varying microstructure, the graded electrode is introduced, and numerical studies are performed under different grading profiles. The results reveal that the overpotential loss of cell is influenced by grading profile, and it is concluded that an optimized grading file shows improved performance.

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