

Electrodeposition of 3D Nickel Microcomponents: Simulation Assisted Synthesis

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Abstract

Template assisted electrodeposition (also known by its German abbreviation: LIGA) is a well-known technique to create metallic nano-, and microcomponents. Recent progress in 3D lithography techniques provides tools to create complex 3D templates for electrodeposition in the micro- and nanoscale. A 3D tertiary current distribution simulation was created, to investigate the various challenges that arise during the LIGA process, such as deposit growth velocity, local current density in the template, mass transfer through the template to the electrode front. The simulation was based on multiple electrochemical measurements to assess electrolyte properties. A 3D microstructure design was chosen for future mechanical testing and the simulation was used to assist with the template design and determination of the correct reverse pulse deposition parameters to reach a good filling ratio. The nickel 3D structure was successfully deposited and the microstructure within was investigated.