Localized Electrochemically Deposited Cantilever Beam and It ’s Fatigue Characteristics

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ABSTRACT

Localized electrochemical deposition method can be used in the fabrication of micro-sized structure with high aspect ratio. As the process is getting more and more popular, the automatic control utilizing computer programming not only can speed up the process but also increase the variety of the fabricated structures. A new methodology in controlling the movement of the anode in order to improve the surface uniformity and reduce the porosity inside the deposited structure was proposed in this thesis. This control algorithm was implemented employing LabVIEW. The fundamental resonance frequency of the fabricated microstructure in cantilever configuration was determined by using base excitation of a piezoelectric actuator platform. Therefore, the apparent Young ’s modulus and porosity of the microstructure can be inferred from the measured resonance frequency. Furthermore, the outer appearance of the microstructure was also examined employing SEM. Finally, the fatigue strength of the deposited material was evaluated by exciting the microcantilever beam in harmonic oscillation with an attached mass at the free end to increase the dynamic loading effect.

Keywords : Localized Electrochemical Deposition, LabVIEW,Piezo-electrical devices, Density, Cantilever Beam,Fatigue Characteristics

Table of Contents

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