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High strength Au film fabricated by advanced electrochemical technique in supercritical CO<sub>2</sub> emulsified electrolyte for MEMS accelerometers

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In recent years, Au has become promising material used as the movable structures and proof mass in micro-electricalmechanical system (MEMS) accelerometers, because the density of Au is about 10 times higher than that of silicon and the sensitivity of the MEMS accelerometer can be improved with a reduction in the density. However, Au is known to be a soft material and the mechanical strength becomes a concern in miniaturization of the MEMS device. One of the approaches is to decrease the grain size of the Au material to increase the mechanical properties according to the Hall-Petch relation. Pulse plating has been reported to be effective to fabricate metal films with finer grain, higher uniformity and lower porosity. On the other hand, application of supercritical carbon dioxide (Sc-CO<sub>2</sub>) in electroplating of metal film has also received recent research interests. Physical and transport properties such as density, viscosity, diffusivity and reactant solubility in Sc-CO<sub>2</sub> can be adjusted through control of pressure and temperature. Sc-CO<sub>2</sub> is often used as a substitute or additive to control overall physical and transport properties of the reaction medium. Surface tension and viscosity of Sc-CO<sub>2</sub> are much lower than those of aqueous solution. In this work, grain refinement, surface smoothening and compressive strength enhancement of Au films were achieved by an electroplating using Sc-CO<sub>2</sub> emulsified electrolyte.

## Biography

Chun Yi Chen has completed her PhD from Tokyo Institute of Technology, Japan. She was a Research Assistant Professor for next generation battery project in Waseda University from 2012 to 2015. She is currently a Research Assistant Professor of Precision and Intelligence Laboratory in Tokyo Institute of Technology, focusing on advanced electrochemical technique for biomedical materials and devices. She has published many papers in reputed journals and received 6 awards from the international conferences.

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