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種別(和文)	要約
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（博士課程）
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論 文 要 約

THESIS OUTLINE

系・コース： Department of, Graduate major in	材料　　系 ライフエンジニアリング　コース	申請学位（専攻分野）： Academic Degree Requested	博士　（　工学　） Doctor of
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要約
Thesis Outline

This thesis is established with the following chapters.

In Chapter 1, backgrounds of metal matrix compounds, co-electrodeposition process, supercritical fluid and electrodeposition with supercritical CO_2 emulsified electrolyte are addressed. After the background, the motivation and objective of this thesis are described.

In Chapter 2, effects of the SC-CO_2 assisted co-electrodeposition process on fabrication of Ni-TiO_2 composite films are demonstrated through comparisons with the conventional co-electrodeposition process. The characterization focuses on the TiO_2 content in the composite film and the TiO_2 distribution in the Ni matrix. A quantified evaluation method of the TiO_2 distribution in the Ni matrix is described.

In Chapter 3, based on the results of chapter 2, an extended study is conducted to further understand influences of the soft particles (SC-CO_2 micelles) on co-electrodeposition of Ni-TiO_2 composite films with an SC-CO_2 emulsified electrolyte. The amount and particle size of the SC-CO_2 micelles in the emulsified electrolyte are manipulated by varying the CO_2 volume fraction and applied pressure in the reaction cell.

In Chapter 4, effects of the hard particles (suspended TiO_2 particles) on co-electrodeposition of Ni-TiO_2 composite films with an SC-CO_2 emulsified electrolyte are evaluated by using TiO_2 particles having three different average particle sizes (21 nm, 100 nm, and 5 μm). Ni-TiO_2 composite films by the conventional co-electrodeposition are prepared for comparisons.

In Chapter 5, the mechanical property and the sample size effect in Ni-TiO_2 composite films fabricated by SC-CO_2 assisted co-electrodeposition are evaluated to demonstrate the advantage in applications. The micro-mechanical property is evaluated by micro-compression test of micro-pillars prepared from the Ni-TiO2 composite films by focus ion beam system.

In chapter 6, as a pre-study for applying SC-CO_2 assisted co-electrodeposition in fabrication of Au matrix composite materials, Conventional co-electrodeposition of Au-TiO_2, a potentially alternative material of Si for the proof mass in micro-accelerometer, was conducted. Effects of the TiO_2 content in Au matrix on surface morphology, crystalline structure, microstructure, and the mechanical properties of the composite film were investigated.

In Chapter 7, general conclusions and the future work of this study are provided.