

## 〔物質生命化学科〕

### 37 - 29 Anodic dissolution of tantalum and niobium in acetone solvent with halogen additives for electrochemical synthesis of Ta<sub>2</sub>O<sub>5</sub> and Nb<sub>2</sub>O<sub>5</sub> thin films

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Tantalum(V) and niobium(V) oxide films, which are typically difficult to prepare by electrochemical methods using aqueous solutions, are easily fabricated in an acetone bath using Ta and Nb anodes as the metal sources and a metal-free solvent containing halide ions as the supporting electrolyte. At the initial stage of electrolysis, anodic oxidation of the metal anode proceeds in the presence of water as an impurity in the acetone solvent. Subsequently, pitting corrosion of the oxide film on the metal anode occurs as a result of the action of halide ions. In this stage, anodic corrosion proceeds only in the presence of Br<sub>2</sub>, and not in acetone containing I<sub>2</sub>. Finally, Ta or Nb species are deposited directly on the cathode surface via the reactions with cathodically generated hydroxide ions, and the films need to be annealed at high temperature to effect crystallization. In these processes, the metal plate acts as a soluble anode with respect to Br<sup>-</sup> and as a metal source for electrodeposition. The coating on a stainless steel substrate prepared by the present technique acts as an effective barrier against electrolytic corrosion.

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