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The Influence of Contact Material on Lateral Wet-Etching of Nickel Thin Films in Lamellae Structure

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Abstract

The characteristics of lateral Ni film etching by nitric-acid-based etchant are examined using samples with patterned lamellar layers consisting of SiO₂/Ni/Al₂O₃/Ni/Al₂O₃ toward the fabrication of hierarchical structures. The lateral etching length increased with increasing etching time, despite the difficult penetration of the etchant through the nanoscale passages in the lamellar layers. However, a higher etching rate (2.1 nm/s) was observed in the lower Ni film that is in contact with SiO₂ and Al₂O₃ layers on the bottom and top, respectively, compared to that (1.6 nm/s) of the upper Ni film that contacts with only Al₂O₃ on both bottom and top sides, due to stronger wetting of SiO₂, inducing easier penetration of the etchant into the nanoscale passage between the surrounding layers. Moreover, the influence of Ni film thickness on the lateral etching characteristic was also investigated. The difference in the lateral etching length of the upper and lower Ni films decreases when the Ni film thickness is increased, because of the reduced proportion of the interface region with respect to the Ni-film volume. Despite different

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