

STM Investigation of Methanol Adsorption on Al₂O₃/NiAl(110) Deposited by Pulsed Injection

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Etching of an ultrathin aluminum oxide film on NiAl(110) substrate by methanol is studied by home-built scanning tunneling microscopy at room-temperature. We deposited liquid methanol on thin alumina film by using a high speed solenoid valve suitable for deposition of thermally unstable molecules. It is found that only the reflection domain boundary between two domains was preferentially etched by methanol. Since the reflection domain boundary has many oxygen vacancies and irregular structures, judging from the fact, we assume that oxygen vacancies cause the chemically reactive phenomena of methanol in reflection domain boundary on an alumina film. The reactivity of the reflection domain boundary is attributed to the oxygen vacancies due to irregular structures. Similar reactivity is found on the oxygen deficient alumina produced on top of the intact alumina.

Keywords: Scanning Tunneling Microscopy, Etching, Methanol, NiAl(110)