

Growth of the single and epitaxial MgO film on Fe(001)

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The epitaxial growth of MgO film on Fe(001) has been investigated by scanning tunneling microscopy (STM). After confirming the clean Fe(001)-c(2×2) substrate by STM, Mg was deposited at room temperature (RT) under O₂ partial pressure of 10⁻⁷ Torr. The MgO was grown as clusters, not as an epilayer even after postannealing at 400 °C, as shown in Figure (a). On the contrary, when Mg was deposited on Fe(001)-c(2×2) at RT and post-oxidized through exposing O₂ at partial pressure 10⁻⁷ Torr, the thin-layered film with some clusters was formed. Extended-annealing at 400 °C reduced the cluster density, and finally the single and epitaxial MgO-c(2×2) film was formed on Fe(001)-c(2×2) as shown in Figure (b). This ultrathin MgO film formed on Fe is expected to be applied to many technological applications, such as catalysis, microelectronics, and magnetic devices.

