

Pulsed laser deposition of metal nano-dots on Si substrate using an anodic aluminum oxide as a nano-template

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We report the fabrication of metal nano-dot arrays on Si substrate via a pulsed laser deposition (PLD) using an anodic aluminum oxide (AAO) as a nano-template. AAO templates with a pore diameter of 50 nm and a depth of 700 ~ 800 nm were produced by anodic oxidation of aluminum sheet. To obtain the AAO template with a uniform size and a hexagonal arrangement, the experimental conditions of anodic oxidation and the etching time were optimized. The AAO template was then adsorbed on a Si substrate and various kinds of metal and semiconductor nano-dots were deposited by PLD technique. With variation of the laser power, deposition time, and an alignment of a target and Si substrate, optimum conditions for the nano-dot array were investigated. We could successfully form a regular array of nano-dots in this method. In this paper, we will also discuss the growth mechanism of nano-dots by PLD technique.