Scanning tunneling microscopy modification of Ag thin films on Si(100): Local rearrangement of the Si substrate by Ag/Si eutectic phase formation

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The melting, eutectic alloy formation, and evaporation, induced locally by a scanning tunneling microscope, was studied for 20 nm Ag films, deposited on hydrogen-terminated Si(100) surfaces. The Ag thin film can be locally rearranged or evaporated with a lateral resolution of 100–150 nm. For long interaction durations 50–70 nm wide and 30 nm deep, grooves could also be cut into the Si substrate. The modification mechanism can be explained by a model involving local melting, alloy formation, and evaporation.