Using silicide formation in Mo/Si multilayers to produce narrow band mirrors


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As shown in [1], Mo₅Si₃ and MoSi₂ silicides are naturally formed in Mo/Si multilayers, even when the layers are deposited with particles of thermal energy e.g. by e-beam evaporation. During their formation silicides consume part of the deposited material. Therefore, by adjusting the amount of deposited Mo in Mo/Si multilayers, it is possible to obtain MoₓSiₜ/Si systems that do not contain pure Mo layers. Lower optical contrast of silicides compared to pure molybdenum further reduces the bandwidth of the produced "Bragg crystal" mirrors. Optical characteristics of these mirrors can be easily adjusted to mimic the throughput of the multiple reflection mirror system. This can be used in devices for characterization of sources for EUVL systems.

In this work we present MoₓSiₜ/Si multilayers produced by e-beam evaporation of Mo and Si, and study their structure (composition, roughness, crystallization) and reflection characteristics at 0.15 and 13 nm.