

Abstract Submitted
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Interaction of benzene and MMA vapors with TiO₂ surface: Relevance to EUV Lithography¹ BORIS YAKSHINSKIY, SHIMON ZALKIND, ROBERT BARTYNSKI, Rutgers University — We characterize the surface processes that affect the reflectivity and lifetime of TiO₂ – capped multilayer mirrors used in EUV lithography. Low energy electron beam is used to mimic excitations initiated by EUV radiation. Temperature programmed desorption, x-ray photoelectron spectroscopy, and low energy ion scattering are used to analyze the surface reactions. Carbon film growth on TiO₂ (011) crystalline surface is measured during electron bombardment in benzene or MMA vapor (model background gases) over a wide range of pressures and temperatures near 300 K. The surface temperature, gas pressure and electron energy are shown to be important for growth of carbon. The substrate temperature rise lowers the carbon accumulation rate. Increasing the vapor pressure over the surface enhances the carbon deposition, and variation of the electron energy shows a pronounced influence on the reaction rate. Low energy secondary electrons excited by EUV photons contribute substantially to carbon accumulation on clean TiO₂ cap layers. The steady-state coverage of the molecules on the surface and the cross-sections for electron-stimulated dissociation are key parameters for understanding and modeling the processes on the EUVL mirrors.

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