Initial Stages of Growth of Poly(*p*-xylylene) Coatings: AFM Study[1]

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Abstract—The morphology of poly(*p*-xylylene) ultrathin films prepared by vapor deposition polymerization on the surface of single-crystal silicon (100) and on the cleaved surface of mica at a substrate temperature of 20°C has been studied by atomic force microscopy. At the initial stage, the growth of the poly(*p*-xylylene) coating follows the island mechanism. Within the framework of pyramidal model of island growth, the mean diffusion length for monomer *p*-xylylene is calculated: For the single-crystal silicon, this parameter is 15 ± 3 nm; for the cleaved surface of mica, 9 ± 2 nm. The nature of the substrate and defects on its surface show a peculiar effect on the structure of the poly(*p*-xylylene) coating. Thus, at a low monomer flow, nucleation of polymer islands on the surface of silicon is predominantly homogeneous, whereas on the cleaved surface of mica, it is heterogeneous. A change in the monomer flow significantly affects the rate of nucleation of polymer islands.

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