Evaporation and thermal cracking of dimeric parylenes

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The common industrial technique for the deposition of coatings of polyparylene on threedimensional substrates is the so-called Gorham method, which makes use of thermally cracked, dimeric precursors that form a polymeric film on a cold substrate. Although this method is easily applied, it is still a challenge to coat surfaces with thin, homogeneous layers less than 1 lm in thickness since mass flow controllers cannot be applied. To overcome this deficiency, several methods have been developed. The authors present here a new technique which allows sudden starts and stops simply by variation of the chamber pressure with an inert gas. Moreover, deposition of reproducible, precise layers of polymeric parylenes requires knowledge of the vapor pressures of the dimeric precursors, the equilibrium for the dissociation into monomers, and the flow of dimers into the reactor. Two straightforward manometric methods are used to measure the vapor pressure, whereas the equilibrium is measured by mass spectrometry. The flow into the reactor is precisely determined under various conditions. Modeling of the equilibrium performed with GAUSSIAN simulation software at the ab-initio level yields unexpected, good agreement with the measured data. VC 2013 American Vacuum Society.
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