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Multilayer and functionally gradient films of plasma polymers intended as compatible interlayers for hybrid materials

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Abstract

Complex film structures, such as multilayer and gradient films, were deposited using tetravinylsilane monomer by plasma-enhanced chemical vapor deposition. The optical and mechanical properties of the deposited film were controlled by the effective power if pulsed plasma was used. Functionally nanostructured films with zigzag, step, and gradient distributions of optical and mechanical properties across the film were constructed in one deposition using time-dependent effective power. The optical and mechanical properties of the deposited films were investigated by spectroscopic ellipsometry and cyclic nanoindentation measurements, respectively. Analyses confirmed expected patterns of optical properties across the film structures. Controlled deposition of tailored films is a new technological step for the creative design and application of complex film structures in smart materials and devices.

Keywords: multilayer, gradient film, plasma polymerization, ellipsometry, nanoindentation

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