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PACVD SiOx coatings deposited by μ-wave technology

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SiOx films are widely spread in various applications, such as semiconductor manufacturing, glass industry, sensors, decorative coatings. The interest in them comes from their optical transparency, diffusion, electrical and thermal barrier properties, high surface hardness, and chemical inertness. For many applications, they are deposited by sputtering, either reactively from a silicon target and osygen gas, or directly from a silica target. In both cases there are serious drawbacks. In the first case, a complicated control system is needed to keep the process in the desired oepating window. In the second case, rf-sputtering must be used, which brings higher equipment costs, lower deposition rate and problems with the uniformity of the film in large-scale coaters.
In this study, a PACVD method based on microwave-generated plasma in a commercial PVD machine is presented. The methode improves by a factor of two the deposition rate in comparison to magnetron sputtering. The SiOx films are deposited from HMDSO precursor and oxygen on various types of substrates - glass, silicon wafers, high-speed steel and polymers. The results include the optical, electrical, mechanical and barrier properties of the coatings as a function of the gas mixure ratio and the main process parameters. The method allows also for depositing of coatings with tunable hydrophobicity in a wide range - water contact angles between 40 to 120 degrees.

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