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MECHANICAL AND OPTICAL PROPERTIES OF SILICON NITRIDE THIN FILMS ON GLASS

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Optical thin films have been widely used in glass coating industry for various energy saving applications such as solar control and low emissivity glasses. However, handling and processing of these systems can lead into various mechanical defects decreasing its lifetime and optical performance. Therefore, understanding and control of the mechanical properties plays an important role in thin films production. Silicon nitride is one of the most commonly used materials in the optical systems. Its high refractive index and good mechanical properties provide different functionalities. It can be used as a buffer layer for tuning of the optical performance or as a topcoat for mechanical protection. Aim of this study is the investigation of mechanical and optical properties of silicon nitride thin films on soda-lime silicate glass. The films were deposited in in-line horizontal coater by DC magnetron reactive sputtering from Si (10% Al) target. Various argon and nitrogen flows, and sputter power were used in order to investigate the influence of the deposition parameters. Hardness and elastic modulus of silicon nitride films were measured by nanoindentation. Curvature method was used to obtain the residual stress values. Characterization of the optical properties was performed by spectroscopic ellipsometry.