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Controlling the Porosity in Silica-like Moisture Barriers Processed in a High Current Dielectric Barrier Discharge

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The high current dielectric barrier discharge was operated in the bi-axial cylindrical electrode geometry. Silica-like films were deposited as a function of the dynamic deposition rate and subsequently characterized by ATR-FTIR and moisture permeation analysis. The relation between microstructure and permeation behaviour with deposition rate is tentatively explained by the presence of an interconnected nano-porous structure facilitating the moisture transport through the films. To overcome the moisture barrier limitations a bi-layer architecture was developed. It was shown that dense silica thin films grown on a porous silica layer can yield excellent effective moisture barrier values less than $\sim 1 \times 10^{-3}$ g/m^2 day.

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