

# Depth profiling of inhomogeneous zirconia films by optical and Rutherford backscattering spectrometric techniques

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**Abstract.** A method of determining an average refractive-index of a transparent inhomogeneous film on a transparent substrate is proposed. It requires making measurements at normal incidence of the transmittance from the sample using a readily available spectrophotometer. The usefulness of the technique is demonstrated by successful application to thermally evaporated zirconia ( $ZrO_2$ ) samples, a type known to present troublesome examples of optical inhomogeneity. Depth profiles of the zirconia films obtained by optical and Rutherford backscattering spectrometric techniques support an earlier model of an inhomogeneous film with a columnar structure. In that reported model it is suggested that the film retains the hexagonal array of closely packed circular bases of the columns and that the columnar diameters decrease with the distance from the substrate side of the film.