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Evaluation of impedance spectroscopy for the characterization of dielectric thin films

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The overall thickness characterization of thin films coated on complex 3D geometries (e.g. drills) is in many cases very time-consuming or expensive. For dielectric coatings impedance spectroscopy can be an option to determine the thickness from impedance measurements. The impedance of a capacitor is directly connected with the layer thickness of the dielectric coating and the permittivity. In order to evaluate the method simple flat samples coated with Al_2O_3 and TiO_2 have been produced by reactive RF sputtering and ALD. The thicknesses measured by X-ray reflectometry and ellipsometry have been compared with the results obtained by impedance spectroscopy. Finally, impedance spectroscopy has been applied to the overall thickness characterization of Al_2O_3 thin films conformally coated on drills with 0.3 and 3 mm diameter.

Keywords
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