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Determination of Thermal Diffusivity in Thin Films Using Lock-in Thermography Technique

This study presents an innovative methodology for determining the thermal diffusivity in thin films of metals and organic materials using advanced thermographic techniques. A diode laser pulse is employed to create a thermal contrast on the sample surfaces, with the resulting temperature evolution monitored by an infrared camera. The collected data is then processed using a MATLAB-developed algorithm, enabling precise calculations of thermal diffusivity. The methodology utilized two laser types: a 415 nm laser and a 910 nm infrared laser, with respective powers of 100 mW and 150 mW. This approach was applied to analyze a thin film of copper oxide and another consisting of Fe3O4 magnetic nanoparticles on glass. The developed technique is both effective and non-destructive, offering a highly accurate tool for the thermal characterization of materials.

Keywords

magnetite, ferrofluids, ferromagnetic, thermal conductivity, TWRC

Reference

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