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**High temperature refractive index determination from polarization-dependent reflectance spectra** MOLLY KATE KREIDER, MARIAMA REBELLO DE SOUSA DIAS, University of Richmond — Determining the temperature dependence of the refractive index of a material is critical in the design of technologies like high temperature electronics, photovoltaics, and other self-heating devices. Conventional refractive index measurement techniques, such as ellipsometry, become very challenging in the case of ultra high temperatures. Theoretical options like material models work in some cases but are not universally accurate. We propose a method of analysis of polarization-dependent reflection measurements as an experimentally feasible option at higher temperatures. Our method utilizes Fresnel analysis and the transfer matrix method to extract refractive index information from same-angle s and p polarization measurements. It works by numerically generating a series of solutions to the relevant system of equations. Due to the transcendental nature of these functions, this process generates many extraneous solutions, which we then filter to extract a single, continuous data set for both the real and imaginary components of the refractive index. We test this method on calculated reflectance spectra for a variety of materials and sample thicknesses. Over each tested material and thickness, our model accurately recovered the refractive index information used to generate the data set, motivating further testing of this model with experimental data as a method for determining refractive index information at ultra-high temperatures.

Molly Kate Kreider
University of Richmond

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