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Determination of graphene layer thickness using optical image processing MONICA COOK, R.G. MANI, Georgia State University — Graphene, a single atomic layer of carbon arranged in a hexagonal lattice structure, is a valuable material in a wide range of research. A significant impediment to graphene research is the need to manually characterize the thickness of high-quality graphene produced via mechanical exfoliation. Traditional methods of characterizing the layer thickness of graphene, including Raman spectroscopy and atomic force microscopy, require expensive equipment and can be damaging to the graphene sample. We examine here a known alternative method for quantitatively determining the layer thickness of graphene on SiO_2/Si based on optical image processing, which is quick, inexpensive, and non-invasive [1]. Using RGB images of a candidate graphene sample and a background image, taken with a simple optical microscope and charge-coupled device (CCD) camera, we process the images with an algorithm based on Fresnel's law to obtain the contrast spectrum. Each layer of graphene exhibits a unique contrast spectrum for its particular substrate, which is measured and used for accurate layer identification. We also discuss how this algorithm can be generalized to characterize the thickness of other promising two-dimensional materials as well as more complex structures on a variety of substrates.

[1] Ni, Z. H., H. M. Wang, J. Kasim, H. M. Fan, T. Yu, Y. H. Wu, Y. P. Feng, and Z. X. Shen. "Graphene thickness determination using reflection and contrast spectroscopy." *Nano letters* 7, no. 9 (2007): 2758-2763.

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