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High Fidelity Detection of Defects in Polymer Films using Surface-Modified Nanoparticles CHAITANYA PRATIWADA, SINDHUJA CHARI, JOLANTA MARSZALEK, MATTHEW BECKER, ALAMGIR KARIM, University of Akron — Defects are ubiquitous to materials and material surfaces. As we push the thresholds of length scale producing defect free materials, surfaces and interfaces, it becomes increasingly difficult to detect their presence over multiple length scales. The ideal example is the semiconductor industry where the driving force is higher performance and lower cost devices with material interfaces. In this regard, Chemical mechanical planarization, CMP, emerged as the premier method for achieving ultra flat surfaces below the 0.35 micron technology node, enabling many of the advanced electronic devices currently in production. The interactions between numerous process settings and output metrics are difficult to predict and often lead to defects. Failure analysis (FA) is critical and the current methods involve advanced imaging methods such as SEM. We design a cost effective method to detect physico-chemical defects at multiple length scales through Polymer-Nanoparticles (NPs) interactions in relatively shorter period of time (time of imaging is reduced 50 fold). This method can be used in conjunction with the traditional imaging methods to pin point location of these defects, which can be further analyzed.

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