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Nanoscale Chemical Analysis with Photo-induced Force Microscopy SUNG PARK, Molecular Vista, Inc. — Photo-induced Force Microscopy (PiFM) is based on AFM coupled to a mid-IR laser. PiFM measures the dipole induced at or near the sample surface by an excitation source by detecting the dipole-dipole force between the induced sample dipole and the mirror image dipole in the metallic tip. This interaction is strongly affected by the optical absorption spectrum of the sample, providing significant spectral contrast which is used to differentiate chemical species. PiFM acquires topography and spectral images concurrently and naturally provides information on the relationship between chemistry and topology. Due to the steep dipole-dipole force dependence on the tip-sample gap distance, spectral images have spatial resolution approaching the topographic resolution of AFM; demonstrating sub 10nm resolution. PiFM spectral images surpass those generated via scanning transmission X-ray microscopy, micro CF Raman microscopy, and EMs, both in spatial resolution and chemical specificity. Broad capabilities of PiFM will be highlighted on organic, inorganic, and low dimensional materials. By enabling nm-scale imaging with chemical specificity, PiFM provides a powerful method to deepen our understanding of nanomaterials and facilitate applications of such materials.

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