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Rolling Magnetic Probes to Measure and Detect Biological Interactions JOSHUA STEIMEL, KATHYRN RANDENE, MICHAEL PAPPAS, DIEGO SANDOVAL, Univ of the Pacific, CHRISTOPHER PETELL, BRIAN STRAHL, UNC, JOE HARRISON, Univ of the Pacific — Measuring biological interaction affinities, specifically protein-protein interaction (PPI), is fundamental to biochemistry, yet many critical interactions are unmeasurable due to a scarcity of reagents and limitations in the affinity ranges that can be measured. Here we present a novel technique which utilizes rolling magnetic probes (RMP) to measure PPI interaction affinities by leveraging the fundamental physical concept of friction induced by binding interactions. RMP measures the translational displacement of protein coated particles on a protein functionalized substrate induced by the increase in friction due to the strength and density of the biological interactions. The translational displacement scales with the effective friction induced by the biological interaction, producing a mechanical signal to indicate binding event. RMP can measure interactions across a wide range of affinities, $10^{-3} - 10^{-15}$M, has high resolution, and measures $\Delta\Delta$G differences of approximately $0.4\frac{kcal}{mol}$, and utilizes a small amount of reagents, 20 pmol. Here RMP provides quantitative insights into the interplay between epigentic modifications.

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