Title: Kinetics and Mechanism of Aggregative Nanocrystal Growth

Abstract: The lack of rational, controlled nanocrystal syntheses results from a poor understanding of nanocrystal-growth mechanisms. Particle aggregation is known to contribute to the growth of colloidal materials, yet the synthetic community has not realized the intrinsic advantages of aggregative growth for achieving diameter and dispersity control. We have adapted the well-known KJMA model to aggregative growth, and have derived a straightforward analytical method for analysis of the growth kinetics. The method allows extraction of separate aggregative-nucleation, aggregative-growth, and Ostwald-ripening rate constants. Application of the method to experimental data for the aggregative growth of metallic nanocrystals will be presented. The results establish that the aggregative nucleation rate, and therefore the ultimate nanocrystal mean size and size distribution, can be controlled through the addition of nucleation-control agents. The limitations of the method will also be discussed.

William E. Buhro was born in Lansing, Michigan in 1958, and raised in nearby Kalamazoo. He earned an A.B. in Chemistry in 1980 at Hope College, and a Ph.D. in Chemistry from UCLA in 1985. Buhro was then a Chester Davis Research Fellow at Indiana University from 1985-1987.

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