Abstract Submitted
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Genetic Engineering of Optical Properties of Biomaterials[1] PAUL GOURLEY, Sandia Labs, ROBERT NAVIAUX, MICHAEL YAFFE, Univ. CA San Diego, SANDIA NATIONAL LABS COLLABORATION, U C SAN DIEGO COLLABORATION — Baker's yeast cells are easily cultured and can be manipulated genetically to produce large numbers of bioparticles (cells and mitochondria) with controllable size and optical properties. We have recently employed nanolaser spectroscopy to study the refractive index of individual cells and isolated mitochondria from two mutant strains. Results show that biomolecular changes induced by mutation can produce bioparticles with radical changes in refractive index. Wild-type mitochondria exhibit a distribution with a well-defined mean and small variance. In striking contrast, mitochondria from one mutant strain produced a histogram that is highly collapsed with a ten-fold decrease in the mean and standard deviation. In a second mutant strain we observed an opposite effect with the mean nearly unchanged but the variance increased nearly a thousand-fold. Both histograms could be self-consistently modeled with a single, log-normal distribution. The strains were further examined by 2-dimensional gel electrophoresis to measure changes in protein composition. All of these data show that genetic manipulation of cells represents a new approach to engineering optical properties of bioparticles.

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