

## ABSTRACT

### MOLECULES IN SINGLE MICRODROPLETS

There are two parts to the research. In the first part, a 10% (w/w) albumin bovine protein solution was injected by a droplet generator as microdroplets of 50  $\mu$  m diameter, and suspended in mid-air by a levitation chamber. The protein in the microdroplet was crystallized in several minutes while levitated in microgravity. This crystallization time is considerably faster than that of the conventional approaches, typically hours to days. No precipitant agents were required, and spherical protein crystals were obtained in this approach.

In the second part, a series of diluted DNA solutions was prepared. Most of these solutions would produce droplets containing single molecules. The diluted DNA samples obtained from regular pipetting and from droplet generation were amplified by polymerase chain reaction (PCR). The single-molecule-level samples were successfully amplified to a concentration level observable by a molecular spectroscopy instrument. It was found that the amplified signal for the samples by droplet generation was lower than the concentration by pipetting after PCR. This result indicates loss of molecules in the droplet generation procedure.

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May 2004