Detecting Mutations in EGFR Using Selective Aggregation Gold Nanoparticles

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We have detected the mutation in the epidermal growth factor receptor (EGFR) of non-small lung cancer patients’ DNA using selective aggregation of gold nanoparticles. Each probe DNA was designed as a perfect complementary sequence to the exon 19 deletion mutation type DNA and exon 21 point mutation type DNA. First, we hybridized the probe DNA with the patients’ DNA, and added the hybridized DNA into the gold nanoparticle suspensions. We then adjusted the salt concentration in order to induce selective aggregation for the perfectly matched sequence. At the optimal salt concentration, we found that gold nanoparticles aggregated exclusively for the hybridized DNA with the mutation. Aggregation of the gold nanoparticles resulted in the color change of the colloidal suspensions. Based on the color change, we were able to detect mutations in the EGFR. This colorimetric method provides a simple and inexpensive way to detect mutations in DNA of real patients.

Figure 1. Typical images of gold nanoparticle suspensions for eight patient samples.