Quantum dot-encoded beads

Multicolor optical coding for biological assays has been achieved by embedding semiconductor quantum dots into mesoporous and macroporous beads at precisely controlled ratios. Owing to their novel optical properties such as size-tunable emission and simultaneous excitation, quantum dots are ideal fluorophores for wavelength-and-intensity multiplexing. Kinetics study reveals that quantum dot doping of porous silica and polystyrene beads can be completed from seconds to minutes. The use of 10 intensity levels and six colors could theoretically code 1 million nucleic acid or protein sequences. Imaging and spectroscopic measurements indicate that the quantum dot-tagged beads are highly uniform and reproducible, yielding bead identification accuracies as high as 99.99% under favorable conditions. DNA hybridization studies demonstrate that the coding and target signals can be simultaneously read at the single-bead level. This spectral coding technology is expected to open new opportunities in gene expression studies, high-throughput screening, and medical diagnostics [1)]

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Gao X, Nie S. Quantum dot-encoded beads. Methods Mol Biol. 2005;303:61-71. doi: 10.1385/1-59259-901-X:061. PMID: 15923675.