127c Single-Walled Carbon Nanotube Labels and Optical Sensors in Live Cells

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Nucleic acid-encapsulated single-walled carbon nanotubes show Raman scattering and near-infrared fluorescence emission within live mammalian cells in long-term culture. Raman scattering of nanotubes was observed within live murine 3T3 and myoblast stem cells, remaining visible for 3 months and also after the H&E staining procedure. Nanotube fluorescence is in the near-infrared region and does not photobleach under prolonged excitation, permitting continuous monitoring of the cells for experiments lasting hours. Fluorescence emission remained visible after a week in culture and exhibited spectral changes within the cells, leading to possible optical sensors. Nanotubes were taken into endosomes and remained after multiple cell divisions, allowing long-term sensing and labeling experiments.