

# Surface-enhanced Optical Upconversion Luminescence (SOUL) for Single miRNA Detection

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## Technology description

MicroRNA (miRNA) is a gene expression regulator performing a critical role in epigenetics. Despite its importance in biology, the detection of miRNA at the single-molecule level has not been reported because it is difficult to detect due to its small molecular weight, fast dynamics, and low dehybridization temperature (melting point). Researchers at the University of California, Berkeley, have designed systems for both intracellular detection of single molecule miRNA of living single human cancer cells employing surface-enhanced upconversion using nanoparticles and locked nucleic acid (LNA) DNA/LNA-RNA hybridization. They have designed and synthesized gold nanoparticles for non-phototoxic wavelength tuning, and a huge surface enhancement, and finally inject into living single cells of drug-resistant human epithelial lung cancer cells. When they meet the target miRNAs, they will be disassembled which brings a dramatic change of signal measured by a home-built, multi-channel dark field imaging system.

## Additional Technologies by these Inventors

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[Monodisperse Silk Emulsions And Microspheres](#)

[A Porous Microfluidic Spinneret](#)

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[Solar Optics-Based Active Panels \(Soap\) For Greywater Reuse And Integrated Thermal \(Grit\) Building Control](#)

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[Zebrafish-based Analysis Platform \(iZAP\)](#)

[Optical Cavity PCR](#)

[Mobile Molecular Diagnostics System](#)

## Application area

Customized SOUL probe targeting specific miRNA for researchers who want to see the expression level of the miRNA of their interests in living single cells.

## Institution

[University of California, Berkeley](#)

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