Docket #: S24-517

Highly Selective Covalent Light-up Fluorescent Dyes for RNA

Stanford researchers have developed a novel class of fluorescent RNA-selective "RiboLight" dyes which enables bright, covalent, and highly specific labeling of RNA without DNA interference, delivering superior performance for imaging and quantification applications.

Current nucleic acid dyes and stains, such as SYBR Green, SYBR Gold, and Stains-All, lack selectivity for RNA and stain DNA almost equally. This poor discrimination, combined with weak light-up properties, results in low signal brightness and specificity. These shortcomings limit accurate visualization and quantification of RNA in gels, imaging assays, and live-cell studies, creating a major bottleneck for researchers studying gene expression, transcription, and RNA biology. The dyes are cell-permeable and exhibit low toxicity.

This invention introduces a new class of fluorescent RNA-selective dyes that overcome these limitations. These dyes exhibit high specificity for RNA over DNA and produce exceptionally bright fluorescence upon RNA binding. The compounds function through covalent interaction with RNA, ensuring strong signal retention, minimal background, and robust light-up behavior. This enables clear, high-contrast visualization and quantification of RNA in a variety of assay formats.

Stage of Development
Research: in vivo
Research: in vitro

Applications

- RNA visualization in gels
- Quantitative RNA assays
- Cellular and tissue imaging/staining

- Ready-to-use RNA-staining kits for research

Advantages

- Highly selective for RNA over DNA
- Far superior in cellular and tissue RNA staining
- Stable fluorescence
- Minimal background or nonspecific staining

Publications

- Jinwoo Shin, Moon Jung Kim, and Eric T. Kool (2025). Fluorogenic Covalent Probes for RNA. *J. Am. Chem. Soc*. 2025, 147, 48, 44384–44395.

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