Docket #: S25-236

Aryl Esters for RNA Modification

Stanford researchers have developed a new class of aryl ester RNA-reactive reagents that are stable for months in water yet rapidly modify RNA upon catalytic activation, enabling reliable, scalable tools for RNA research and therapeutic applications.

RNA chemical modification is central to research and therapeutic innovation, yet existing reagents that target RNA's 2?-hydroxyl groups are highly unstable, short-lived in water, and difficult to synthesize or store. Their instability limits reproducibility, scalability, and commercial use in RNA labeling, analysis, and drug development.

To address this issue, Stanford researchers have invented a new class of aryl ester-based RNA-reactive reagents that fundamentally change the way RNA can be modified. Unlike traditional acylating agents, these reagents are highly stable for months in water and during storage, yet can be rapidly and selectively activated under mild conditions. This activation enables precise, high-yield acyl transfer to RNA without the instability or handling challenges of conventional chemistries. The approach effectively decouples reagent storage stability from reactivity, providing a practical, scalable, and reliable solution to RNA modification.

Stage of Development
Proof of Concept

Applications

- Research kits and reagents for RNA labeling
- RNA-targeted therapeutics

Advantages

- High aqueous stability compared to existing reagents
- Improved selectivity and reproducibility in RNA modification
- Simpler synthesis and purification
- Long shelf life supporting broad commercial and research use

Publications

- Eric T. Kool, Sumon Pratihar, Pavitra S. Thacker, Dipanwita Banerjee, Moon Jung Kim, Ryuta Shioi (2025). RNA 2'-OH modification with stable reagents enabled by nucleophilic catalysis. *RSC Adv.*, 2025,15, 35749-35755.

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