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Detection and Differentiation of Cys, Hcy and GSH mixtures by ¹⁹F NMR Probe

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ABSTRACT

Simultaneous detection and differentiation of biomolecules is of significance in biological research. Biothiols such as cysteine (Cys), homocysteine (Hcy), and glutathione (GSH) play an important role in regulating the vital functions of living organisms. However, existing methods for simultaneous detection and differentiation of Cys, Hcy, and GSH are still challenging because of their similarity in structure and chemical properties. Herein we report a probe that simultaneously detects and discriminates between mixtures of Cys, Hcy and GSH using ¹⁹F nuclear magnetic resonance (NMR). This ¹⁹F NMR probe responds rapidly to biothiols through the Michael addition reaction and subsequent intramolecular cyclization reaction allowing differentiation between Cys, Hcy and GSH through ¹⁹F NMR chemical shift. We demonstrate that this ¹⁹F NMR probe is a powerful method for analysis of complex mixtures.

Graphical Abstract:

Keywords: ¹⁹F Nuclear Magnetic Resonance, Biothiols, Probes, Thiol-addition/intramolecular cyclization

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