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A Ratiometric Fluorescence Probe for Lysosomal Polarity

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ABSTRACT

Lysosomal polarity affects the interaction activities between enzymes and substrates at the cellular level. Abnormal lysosomal polarity closely linked with disorders and diseases is worthy of attention. The first fluorescence probe, which can image polarity ratiometrically and detect lysosomal polarity quantitatively, is reported herein. The probe termed **NOH** can emit dual-peaks both in solvents ($\lambda_{em} = 474, 552$ nm) and in micro-environment. **NOH** exhibits the Boltzmann function response of the fluorescence intensity ratio to the polarity in a wide range and localizes at lysosomes specifically ($R_r = 0.97$). In the method of ratiometric fluorescence imaging with **NOH**, the variation of lysosomal polarity (Δf) can be directly discerned by the color changes. In virtue of ratiometric fluorescence imaging and the Boltzmann function relationship between the fluorescence intensity ratio and the polarity, lysosomal polarity in MCF-7 cells was calculated to be 0.224 and the polarity in the condition of lysosomal storage disorders (or cell death) could also be obtained. This probe will be a promising tool for studying lysosome-related physiological or pathological processes.

Key words: *Fluorescence probe; Polarity; Lysosomes; Ratiometric imaging; Cell*

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