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INNOVATES

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pH-Activable Fluorescent Probes for Targeting Cell Organelles

New single-scaffold pH-activable fluorescent probes enable effective and selective targeting and imaging of cell organelles for applications in drug discovery and cellular biology investigations.

Researchers at Purdue University have developed new pH-activable fluorescent probes for targeting cell organelles in live cells. Unlike traditional multi-step probes for live-cell organelle imaging, this technology requires the use of a common intermediate probe only. In addition, currently, only a few sensing and imaging technologies are commercially available that are responsive to pH; and activation or deactivation by pH can be used to improve targeting to specific cells and organelles. The robust probes created by Purdue researchers emit high fluorescence at the acidic pH of the organelle and negligible fluorescence at cytosolic neutral pH. The probes are soluble, cell-permeable, and readily taken up by target organelles. This platform uses a single molecular scaffold that can be implemented in a variety of applications in drug discovery and other investigations of cellular biology. The researchers have designed three probes using this platform that localize to the lysosome, mitochondria, or nucleus, respectively, and are activated upon uptake by the organelles. These probes were tested in live BV2 microglial cells and had little effect on cellular metabolism. Using primary microglial cells and BV2 cells, the cellular localization was confirmed with confocal microscopy, and the technology was demonstrated to be compatible with cell sorting by flow cytometry.

Advantages:

- pH Sensitive
- Can Improve Drug Targeting

Potential Applications:

- Drug Discovery and Development
- Bioconjugation Reaction Synthesis

Technology ID
2021-CHOP-69413

Category
Chemicals & Advanced Materials/Specialty & Performance Chemicals Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies Pharmaceuticals/Research Tools & Assays

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Technology Validation:

The new pH-activatable fluorescent probes have been used to measure A-beta(1-42) peptide activity, studying microglial uptake in specific cells and organelles.

TRL: 2

Intellectual Property:

Provisional-Patent, 2021-03-12, United States | PCT-Patent, 2022-03-08, WO
| NATL-Patent, 2023-09-08, United States

Keywords: pH-activatable fluorescent probes, targeting cell organelles, live-cell imaging, pH-sensitive probes, drug targeting, single molecular scaffold, lysosome localization, mitochondria localization, nucleus localization, flow cytometry compatible