Dual emission fluorescence probes for ultrasensitive ratiometric sensing

THE EXISTING PROBLEM OR ISSUE
Fluorescent molecules are responsible for the recent increase in our capacity to sensitively monitor biological systems at the cellular and subcellular level.

Most fluorescent probes rely on changes in fluorescence intensity as the reporting mechanism and are susceptible to errors due to changes in probe concentration, excitation or detection efficiency, the concentration and location of quenchers, aggregation, pH, temperature or a lack of specificity. True quantitative measurements in biological systems are difficult or impossible to calibrate in-situ.

OUR SOLUTION
One strategy to overcome these limitations is the design of "self-calibrating" (ratiometric) fluorophores that display dual emission by combining excited state intramolecular proton transfer (ESIPT) with normal intramolecular charge transfer (ICT). Such fluorophores have a unique sensitivity to subtle variations in the local environment that are independent of the probe concentration and other variables.

APPLICATIONS
- Cell sorting and imaging
- Super resolution microscopy
- Environmental sensing
- Protein detection
- Optoelectronic devices

ADVANTAGES | BENEFITS
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Both ESIPT and ICT emissions are visible | Super accurate ratiometric measurements
Sensitive to the local environment | Stop/go indicator or two colour readout
Stable | Room temperature fluorescence and low photobleaching
Small molecule | Freely cell permeable
Simple synthesis | Many analogues and variations possible

INVENTORS
Peter Karuso and Soumit Chatterjee

INTELLECTUAL PROPERTY POSITION
Australian Patent Application: 
Dual emission fluorescent compounds

PUBLICATIONS
S. Chatterjee, A. Datta, P. Karuso, “Room Temperature Dual Fluorescence of a Locked GFP Chromophore”, in preparation

WOULD YOU LIKE TO KNOW MORE?
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We have invented new chemical entities that emit fluorescence at two different frequencies (e.g. cyan and red) in response to the local environment.

This new class of two-colour fluorophores is based on a natural chromophore found inside the Green Fluorescent Protein (GFP).