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Real-time photo acoustic imaging of potassium in vivo JEFF FOLZ, CHANG LEE, WULIANG ZHANG, RAOUL KOPELMAN, University of Michigan — Potassium ions are of physiological interest due to the role they play in the action potential, electrochemically balancing biological ions, and maintaining a healthy heart. Traditionally, *in vivo* potassium-sensing has been performed using ion-specific electrodes. However, these electrodes are incapable of generating images and are inherently invasive in their application. To address this need, we have developed a potassium sensor suitable for real-time *in vivo* potassium sensing and monitoring. Micelles with nanoscale diameters smaller were loaded with a potassium-binding component and a highly absorptive, low quantum yield pH dye. Changes in potassium concentration induce a measurable pH change within the micelle. Via the photoacoustic effect, the excited dye produces ultrasonic signals that allow us not only to non-invasively monitor potassium's real-time behavior in the body, but also generate images from these changes. Our approach boasts a robust sensing range spanning three orders of magnitude and includes typical intra- and extracellular potassium concentrations. These micelles represent the first demonstration of cationic-analyte imaging and will contribute positively to diagnostic efforts.

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