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Fluorescent BODIPY Rotor: Viscometer for Cellular Organelles and Membrane-Mimicking Vesicles[1] J. KIMBALL, S. RAUT, Dept. of Physics and Astronomy, TCU, R. FUDALA, Dept. of Cell Biology and Immunology, UNT Health Science Center, H. DOAN, Dept. of Physics and Astronomy, TCU, B. MALIWAL, Dept. of Cell Biology and Immunology, UNT Health Science Center, N. SABNIS, A. LACKO, Dept. of Integrative Physiology and Anatomy, UNT Health Science Center, I. GRYCZYNSKI, Dept. of Cell Biology and Immunology, UNT Health Science Center, S. DZYUBA, Dept. of Chemistry, TCU, Z. GRYCZYNSKI, Dept. of Physics and Astronomy, TCU — Many cellular processes, such as mass and signal transport, metabolism and protein-protein interactions are governed in part by diffusion, and thus affected by their local microviscosity. Changes in this microviscosity has also been linked to various diseases, including atherosclerosis, Alzheimer's disease and diabetes. Therefore, directly measuring the heterogeneous viscosity of cellular constitutes can lead to greater understanding of these processes. To this effect, a novel homodiemeric BODIPY dye was evaluated as a fluorescent rotor probe for this application. A linear dependence on viscosity in the range of typical cellular microviscosity was established for steady-state and time-resolved properties of the dye. It was then embedded *in vitro* to membrane-mimicking lipid vesicles (DPPC, POPC, and POPC plus cholesterol) and results indicated it to be a viable sensor for lifetime-based determination of microviscosity. The BODIPY dye was lastly endocytosed by SKOV3 cells and Fluorescence Lifetime Imaging Microscopy (FLIM) was performed, successfully mapping the viscosity of internal cell components.

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J. Kimball
Dept. of Physics and Astronomy, TCU

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