DESIGN AND SYNTHESIS OF FLUORESCENT RATIOMETRIC ENVIRONMENT-SENSITIVE PROBES

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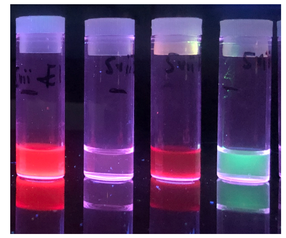
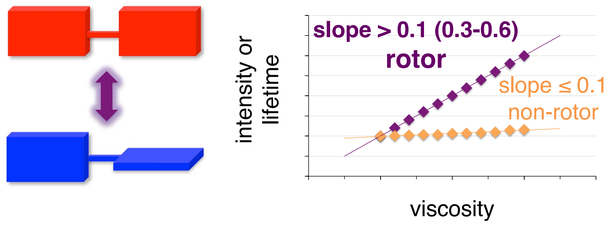


ENVIRONMENT-SENSITIVE PROBES

Environment-sensitive probes – dyes that change their photophysical properties (i.e., fluorescence intensity, lifetime, etc) in response to changes in the environment viscosity, polarity, etc.[1] If the change in the fluorescence parameter is related to internal rotation within the dye, such molecular rotor is a molecular viscometer. Rotor could be easily distinguished from a non-rotor.[2]

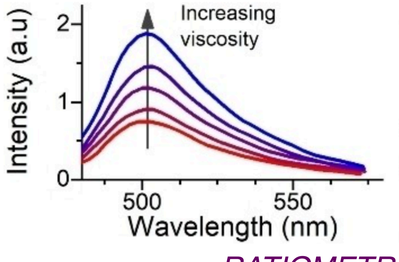


VISCOSITY

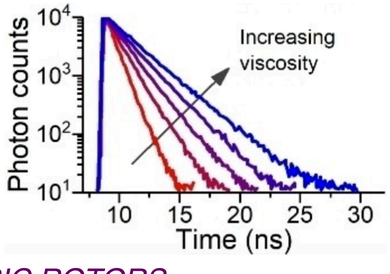
Viscosity is a fundamental physical property of a fluid. Abnormal changes of cellular viscosity are linked to many biological malfunctions and diseases, including cancer, cystic fibrosis, Parkinson's and Huntington's diseases.[2]

MOLECULAR ROTORS AS FLUORESCENCE-BASED VISCOMETERS [3]

intensity-based rotors

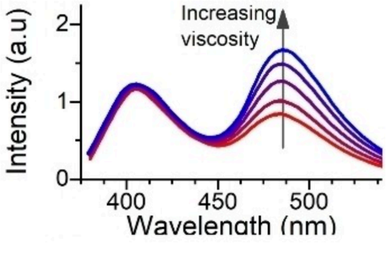


lifetime-based rotors

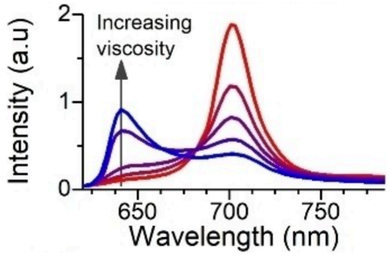


RATIOMETRIC ROTORS

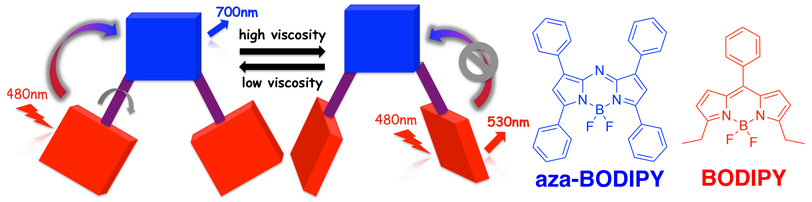
reference-based

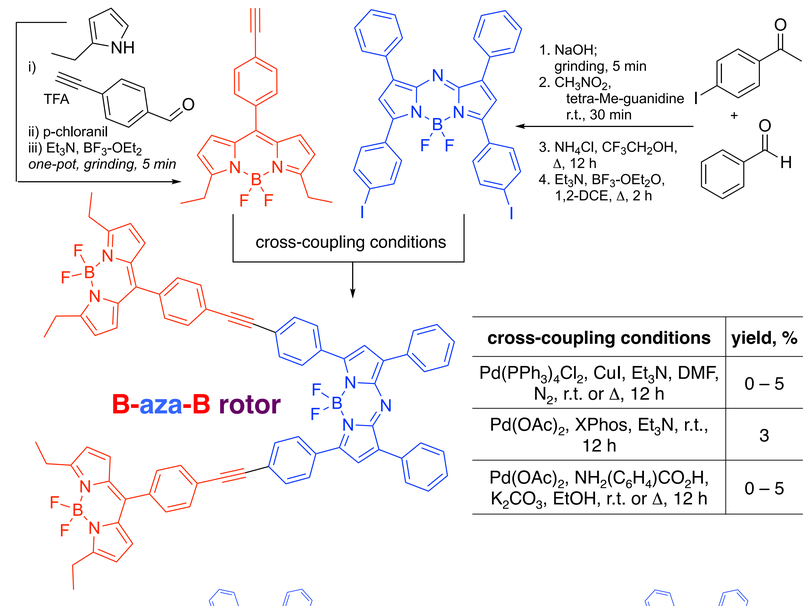


conformer-based

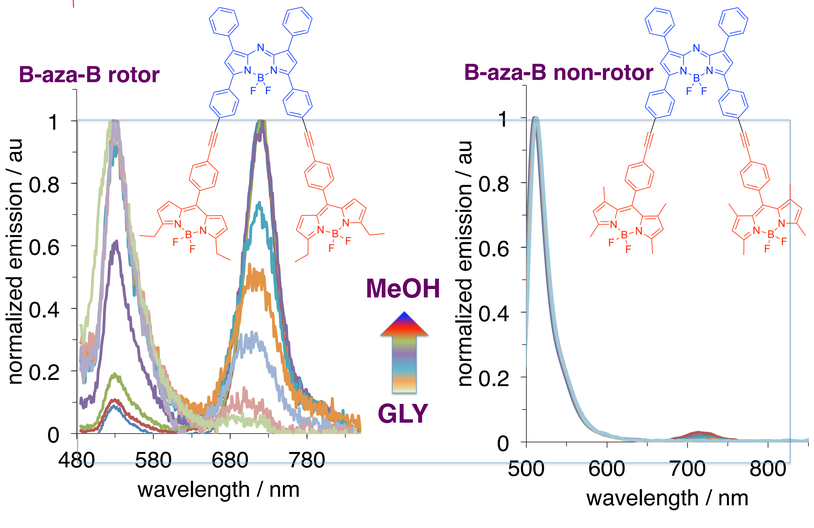


BODIPY–azaBODIPY–BODIPY MOLECULAR VISCOMETERS



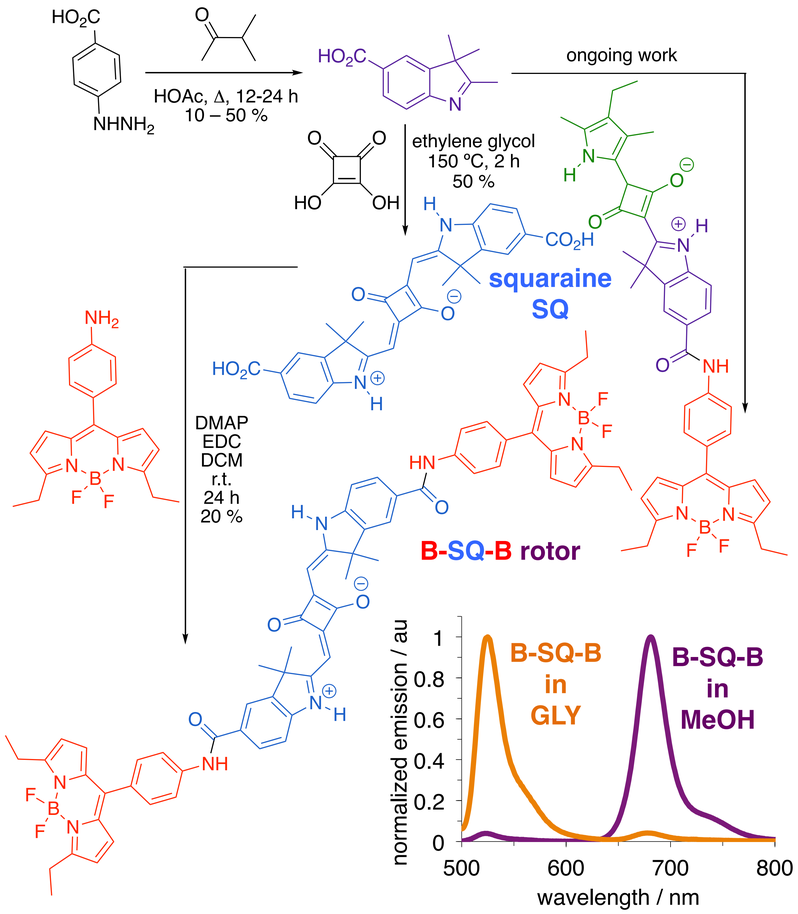


cross-coupling conditions	yield, %
$Pd(PPh_3)_4Cl_2$, CuI, Et_3N, DMF, N_2, r.t. or Δ, 12 h	0 – 5
$Pd(OAc)_2$, XPhos, Et_3N, r.t., 12 h	3
$Pd(OAc)_2$, $NH_2(C_6H_4)CO_2H$, K_2CO_3, EtOH, r.t. or Δ, 12 h	0 – 5



conditions: λex = 480 nm; [**B-aza-B**] = 4 μM (DMSO 0.4 % v/v)
Viscosity: MeOH – 0.7 cP; glycerol/GLY – 1500 cP

BODIPY–SQUARAINE–BODIPY MOLECULAR VISCOMETERS



conditions: λex = 480 nm; [**B-SQ-B**] = 2 μM; (DMSO 0.2 % v/v)
viscosity: **MeOH – 0.7 cP**; **glycerol/GLY – 1500 cP**

REFERENCES

[1] A.S. Klymchenko, *Acc. Chem. Res.* **2017**, *50*, 366,

[2] C. Ma, W. Sun, L. Xu, Y. Qian, J. Dai, G. Zhing, Y. Hou, J. Liu, B. Shen, *J. Mater. Chem. B (materials for biology and medicine)* **2020**, *8*, 9642.

[3] M. Paez-Perez, M.K. Kuimova, *Angew. Chem. Int. Ed.* **2024**, *63*, e202311233.

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