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BODIPY Fluorophores for Membrane Potential Imaging  
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## Water-Soluble BODIPY Dyes for Voltage Imaging

Category

Chemistry in  
Medicine and  
Biology

Key words

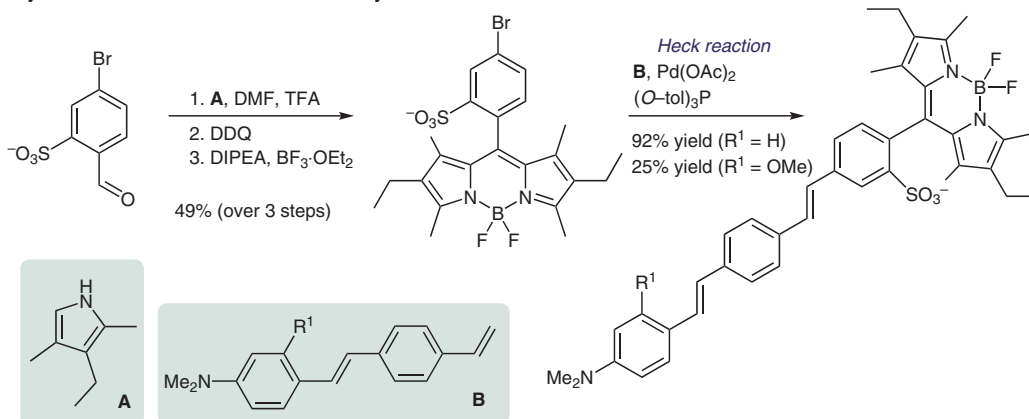
voltage dyes

fluorophores

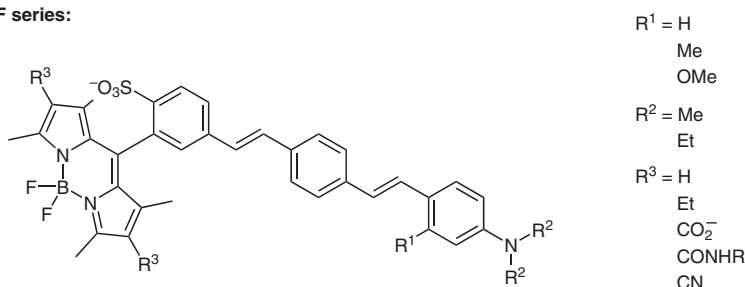
BODIPY

Synfact  
of the  
Month

Synthesis of water-soluble BODIPY VF dyes:



BODIPY VF series:



**Significance:** Previously, water solubility of BODIPY dyes was achieved through direct functionalization of the BODIPY fluorophore. Miller and co-workers report an elegant and versatile solution that does not significantly alter the dye electronics through introduction of a sulfonate on the *meso*-aromatic ring. These fluorophores are used to generate a series of new VoltageFluor (VF) dyes that enable the recording of action potential dynamics in neurons and cardiomyocytes.

**Comment:** The TFA-catalyzed condensation of aldehydes with pyrroles in the synthesis of BODIPY dyes is commonly performed in CH<sub>2</sub>Cl<sub>2</sub> and often reported to be low-yielding. Here, the authors optimized this reaction with their sulfonated aldehyde, which was found to be insoluble in CH<sub>2</sub>Cl<sub>2</sub> and toluene. Comparably good yields were obtained in DMF (e.g. 49% over three steps, see above). Therefore, the reported strategy for water-soluble BODIPY synthesis could be very useful for the wider community.

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