Photophysics and stability of cyano-substituted boradiazaindacene dyes.

Autorzy

Katarzyna Cieślik-Boczula

K. Burgess

L. Li

B. Nguyen

L. Pandey

W. M. De Borggraeve

Mark Van der Auweraer

Noel Boens

Rok wydania

2009

Czasopismo

Photochemical and Photobiological Sciences

Numer woluminu

8

Strony

1006-1015

DOI

10.1039/b905054j

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

The solvatochromic photophysical properties of two fluorescent, cyano-substituted BODIPYdyes—8-(4-bromophenyl)-3,4,4,5-tetracyano-4-bora-3a,4a-diaza-s-indacene (4CN)and8-(4-bromophenyl)-3,5-dicyano-4,4-difluoro-4-bora-3a,4a-diaza-s-indacene (2CN)—have been studiedin various solvents by UV–vis spectrophotometry and steady-state and time-resolved fluorometry.These two BODIPY analogues have comparable photophysical properties, implying that displacementof F by CN at boron has a negligible effect. Both compounds have high fluorescence quantum yieldsUf(0.65–0.90 for4CNand 0.63–0.88 for2CN) in the solvents studied and display mono-exponentialfluorescence decay profiles in nonprotic solvents. A new, generalized treatment of the solvent effectbased on four mutually independent, empirical solvent scales (dipolarity, polarizability, acidity, andbasicity of the medium) indicates that solvent polarizability and, to a lesser degree, solvent (di)polarityare crucial factors causing the solvent-dependent shifts of the UV–vis absorption and fluorescenceemission. The rate constants of radiative deactivation (kf) are nearly independent of the nonproticsolvent [kf=(1.4±0.1)¥108s-1for4CNand (1.5±0.2)¥108s-1for2CN]. Both compounds undergo acolor change in polar aprotic solvents (acetone, acetonitrile, andN,N-dimethylformamide), which canbe stopped by addition of HClO4. The kinetics of this color change indicates that the decomposition ofthese cyano-substituted BODIPY compounds is complex.

Adres publiczny

http://doi.org/10.1039/b905054j

Strona internetowa wydawcy

https://www.rsc.org/