

# Aminonaphthalimide-squaraine dyads: photophysical properties and bioimaging application

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Squaraines is an important part of the cyanine family which have high extinction coefficients, sharp absorption bands, and intense fluorescence spectra in the red and near infrared region in solution.[1] The unique electronic structure and such optical characteristics have made squaraines very attractive for many applications, such as chemosensors, organic solar cells, optical recording media, electroluminescence diodes, and nonlinear optical devices.[2] 2,3,3-Trimethylindolenine-based squaraines are prepared by the condensation of the heterocyclic quaternary ammonium salts with squaric acid in high boiling point alcohols such as butanol, often in a mixture with aromatic hydrocarbons such as toluene or benzene in order to azeotropically remove the water formed in the condensation reaction (Dean–Stark apparatus).[3]

In this communication, we present a series of aminonaphthalimide–squaraine dyads (1) and (2) that shown squaraine fluorescence sensitization [3]. This was observed upon one- and two-photon excitation of naphthalimide subunits, which extends the application range of the investigated bichromophoric dyads in terms of accessible excitation wavelengths. In comparison with the direct excitation of the squaraine chromophore, the two-photon absorption cross-section  $\delta$  of the dyad (1) is significantly incremented by the presence of the aminonaphthalimide donor.

The applicability of the new dyad in the one- and two-photon excitation mode was demonstrated in solution and in a proof-of-principle approach in the fluorescence imaging of HeLa cells.

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## References

[1] W. Sun, S. Guo, C. Hu, J. Fan, X. Peng, *Chem. Rev.* **2016**, *116*, 7768–7817.

[2] S. Sreejith, P. Carol, P. Chithraa, A. Ajayaghosh, *J. Mater. Chem.*, **2008**, *18*, 264–274.

[3] N. Barbero, C. Magistris, J. Park, D. Saccone, P. Quagliotto, R. Buscaino, C. Medana, C. Barolo, G. Viscardi, *Org. Lett.* **2015**, *17*, 3306–3309.



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