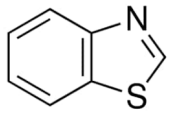
MOSBRI
ESC 2

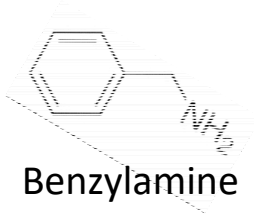
Amyloid ligands and their fluorescent properties

Sofie Nyström

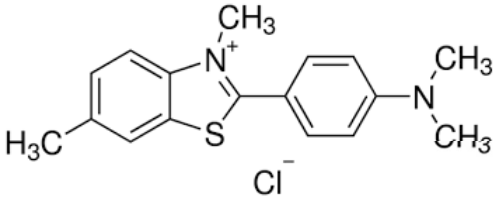
ThT and some analogues - **benzothiasoles**



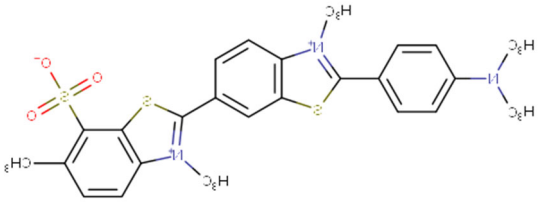
Benzothiasole



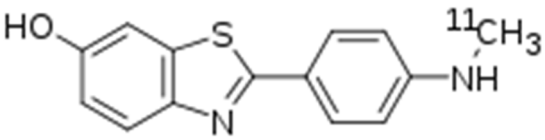
Benzylamine



Thioflavin T

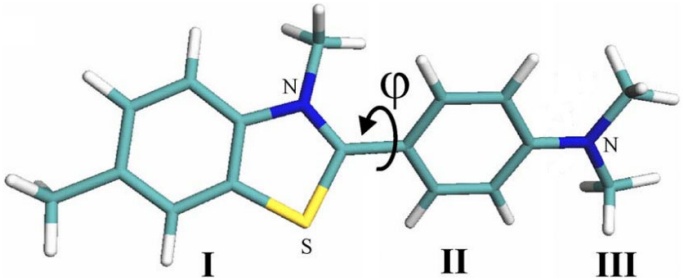


Thioflavin S



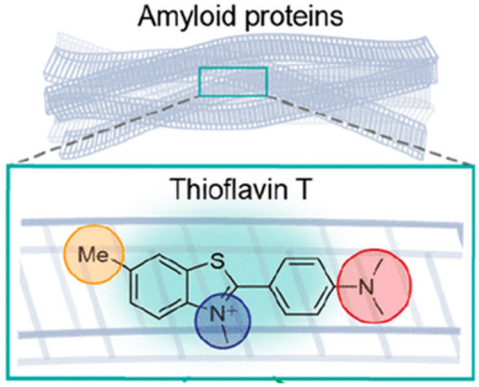
PiB for PET

Molecular rotor quenched when freely rotating…….



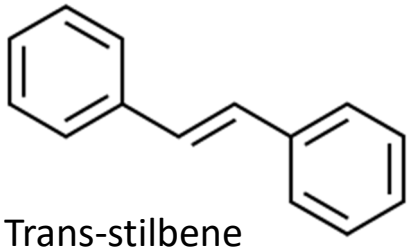
Fluorescence Quantum Yield of Thioflavin T in Rigid Isotropic Solution and Incorporated into the Amyloid Fibrils. Sulatskaya AI, Maskevich AA, Kuznetsova IM, Uversky VN, Turoverov KK (2010) PLoS ONE 5(10): e15385. https://doi.org/10.1371/journal.pone.0015385

and fluorescences when bound

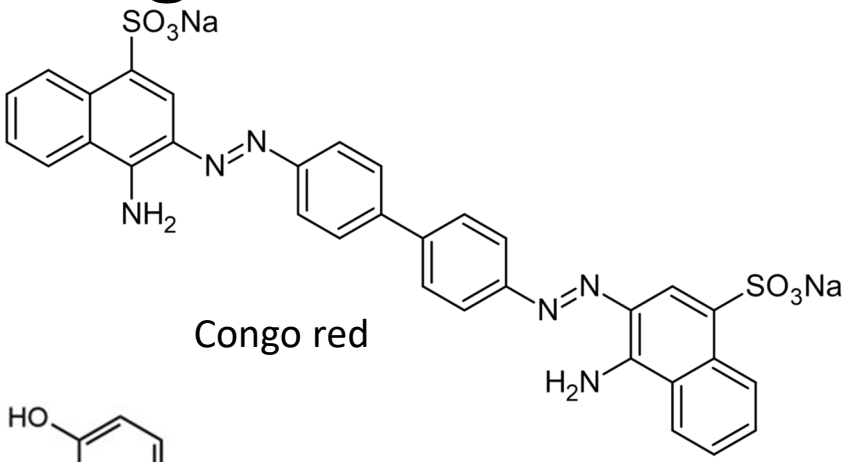


A Comparative Photophysical Study of Structural Modifications of Thioflavin T-Inspired Fluorophores
Lisa-Maria Needham, Judith Weber, Colin M. Pearson, Dung T. Do, Felix Gorka, Guanpeng Lyu, Sarah E. Bohndiek, Thomas N. Snaddon, and Steven F. Lee
The Journal of Physical Chemistry Letters 2020 *11* (19), 8406-8416

Congo red and some analogs - **Stilbenes**

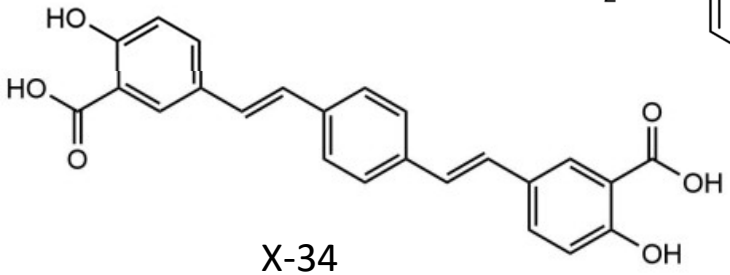


Trans-stilbene

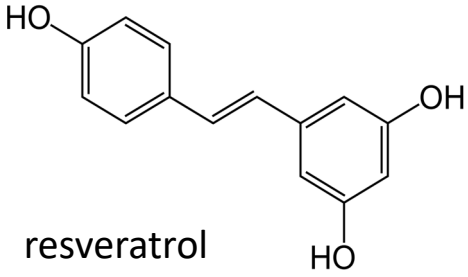


Congo red

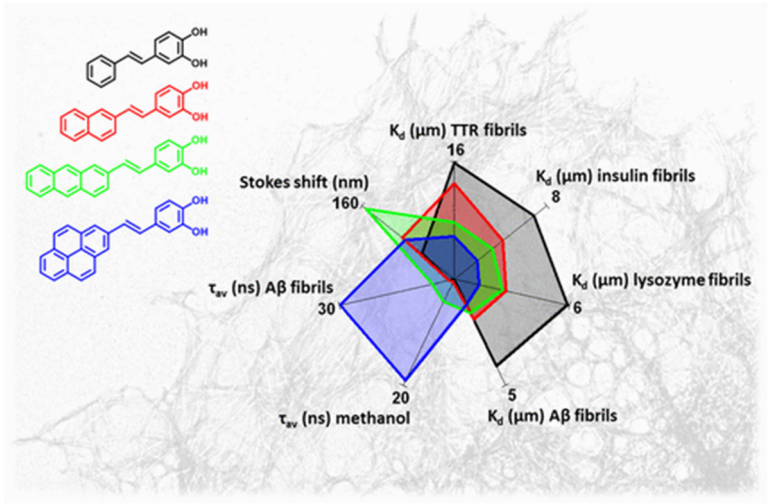
Fluoresce when in planar conformation

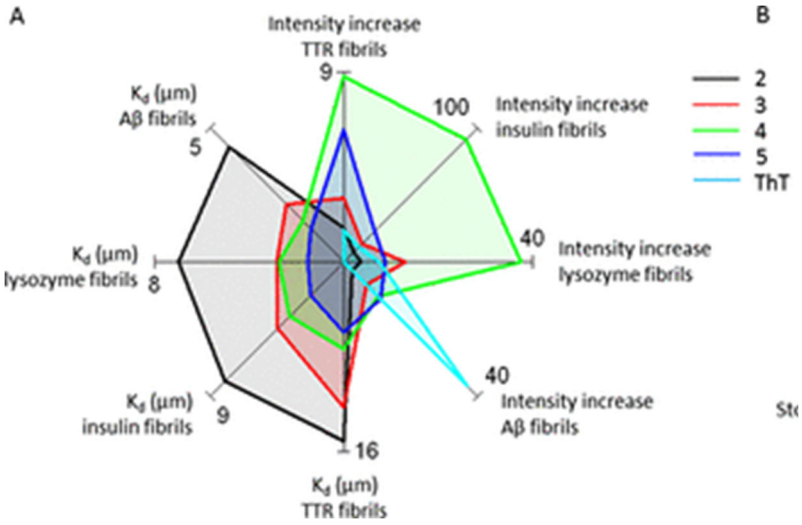


X-34

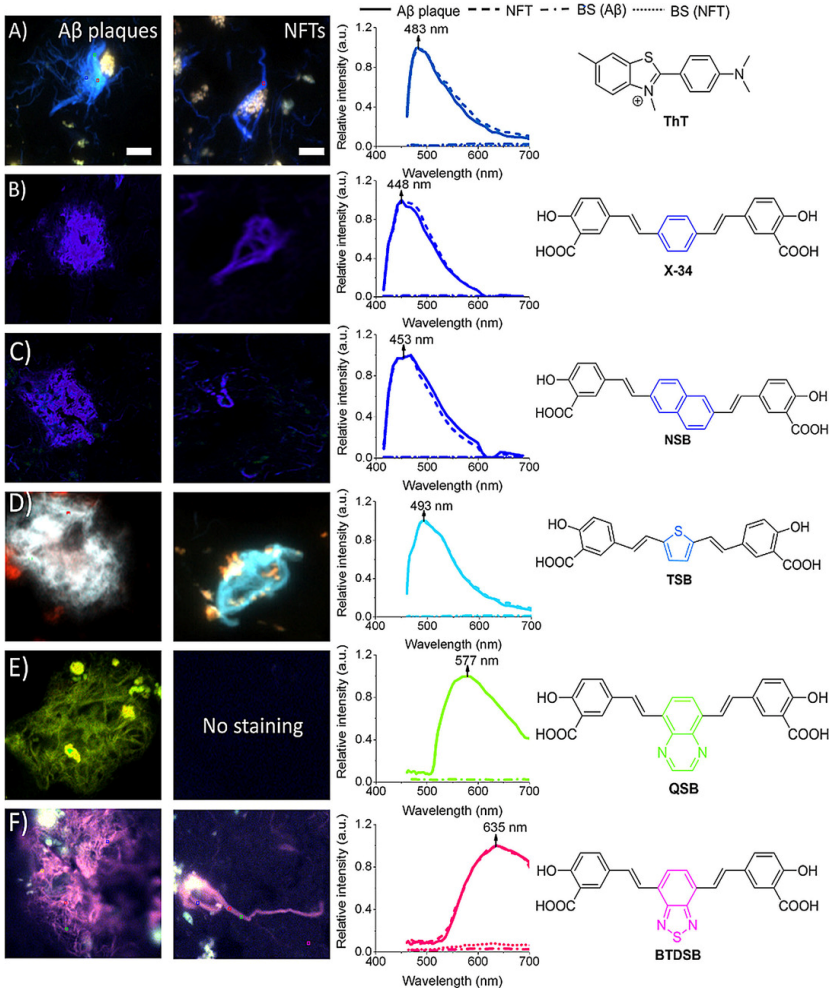


resveratrol



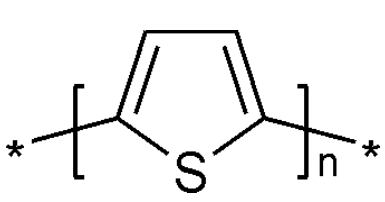


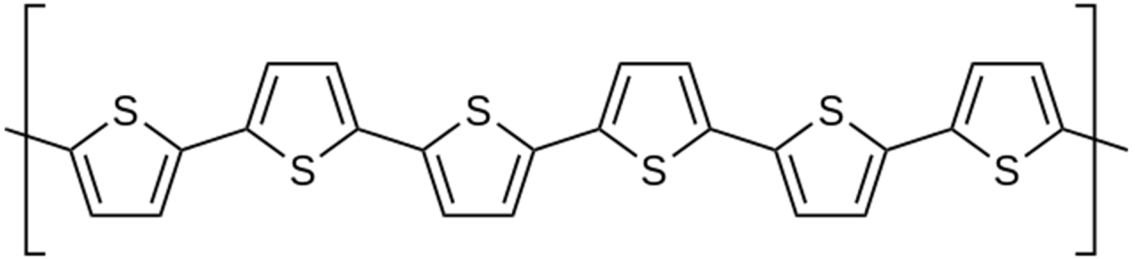
trans-Stilbenoids with Extended Fluorescence Lifetimes for the Characterization of Amyloid Fibrils Jun Zhang, Alexander Sandberg, Xiongyu Wu, Sofie Nyström, Mikael Lindgren, Peter Konradsson, and Per Hammarström *ACS Omega* 2017 *2* (8), 4693-4704 DOI: 10.1021/acsomega.7b00535



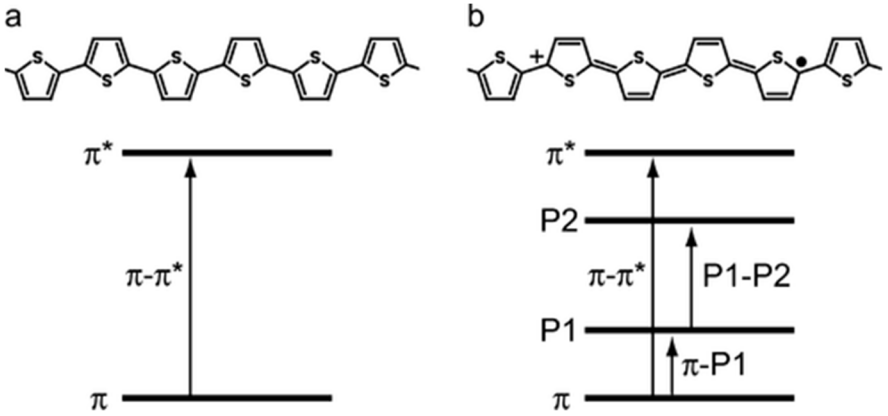
Detection and Imaging of Aβ1-42 and Tau Fibrils by Redesigned Fluorescent X-34 Analogues. Zhang J, Sandberg A, Konsmo A, Wu X, Nyström S, Nilsson KPR, Konradsson P, LeVine H 3rd, Lindgren M, Hammarström P. Chemistry. 2018 May 17;24(28):7210-7216. doi: 10.1002/chem.201800501. Epub 2018 Apr 26.

Conjugated **thiophenes**





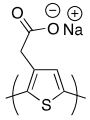
Shifting the conjugated electrons will alter the Stokes shift



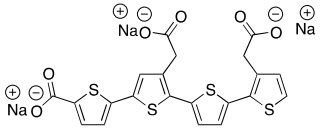
Microscopic Mobility of Polarons in Chemically Doped Polythiophenes Measured by Employing Photoluminescence Spectroscopy Takeshi Koyama, Arao Nakamura, and Hideo Kishida *ACS Photonics* 2014 *1* (8), 655-661 DOI: 10.1021/ph5000488

LCOs

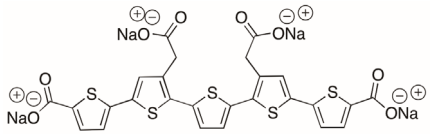
PTAA



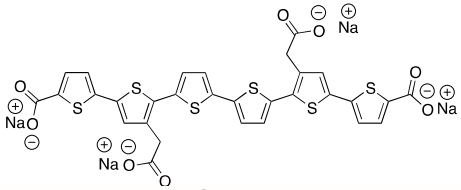
qFTAA



pFTAA



hxFTAA



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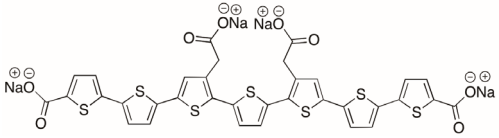
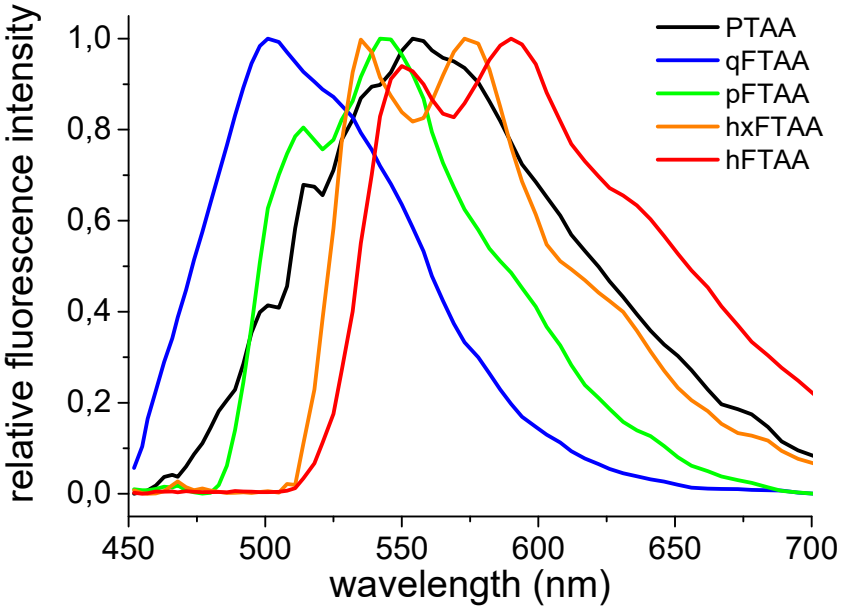
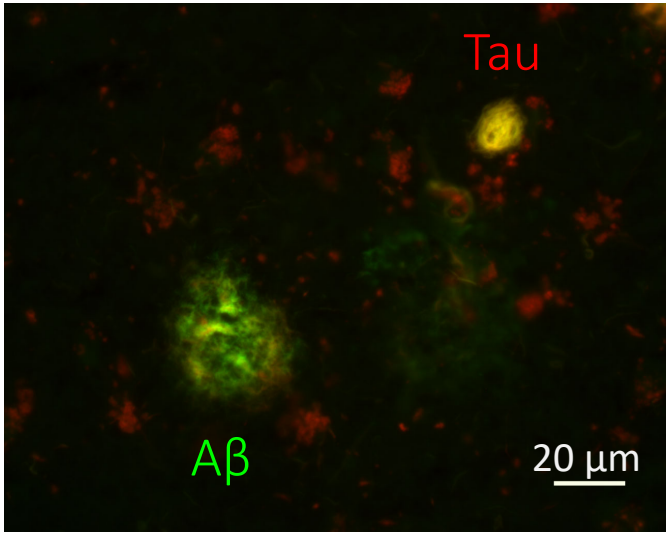


Fluorscence emission spectra



Hyperspectral imaging in research

-discriminate between two types of proteins



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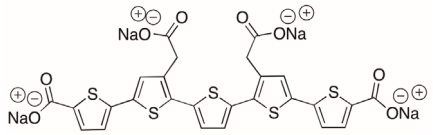
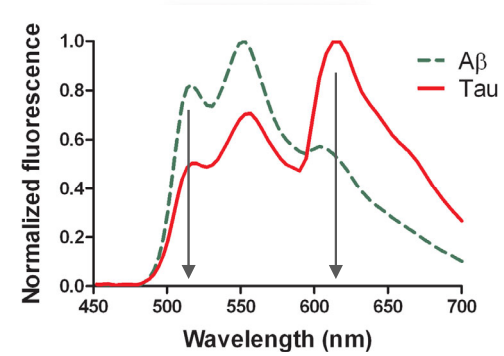
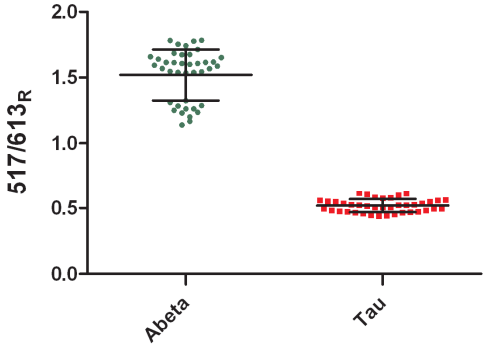




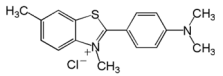


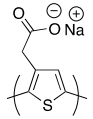
LINKÖPING UNIVERSITY

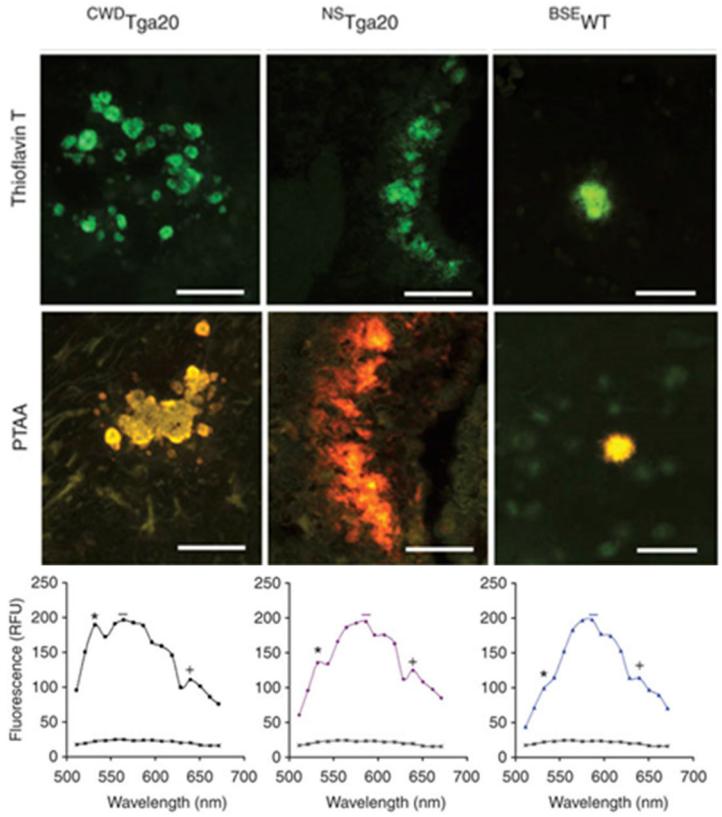
Klingstedt et al *Organic & biomolecular chemistry 2011 9*, 8356-8370

Prion strain discrimination

-detect small variations in amyloid structure





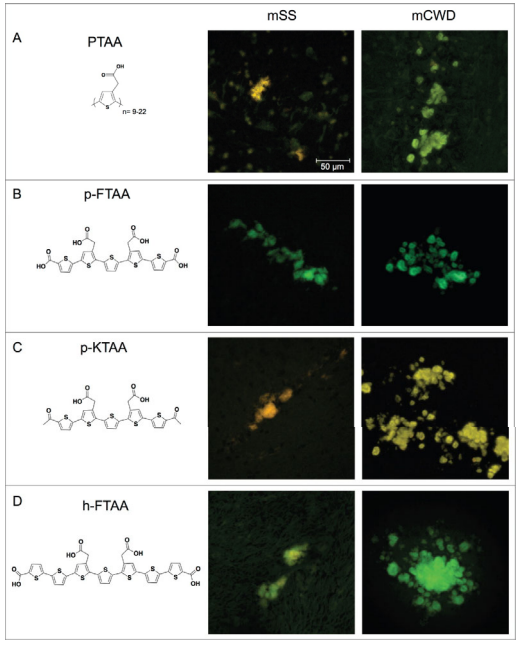


Sigurdson, Nilsson et al *Nature methods 2007 4*, 1023-1030

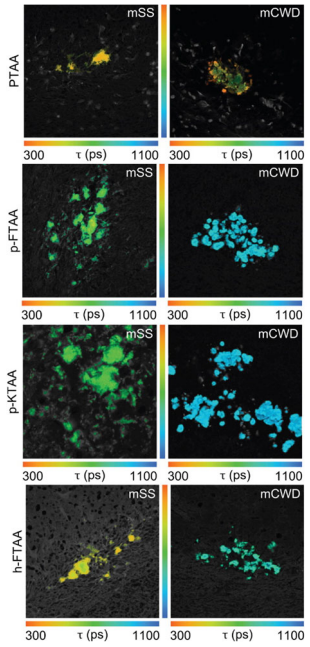
Prion strain discrimination

-detect small variations in amyloid structure

Fluorescence emission imaging



Fluorescence lifetime imaging

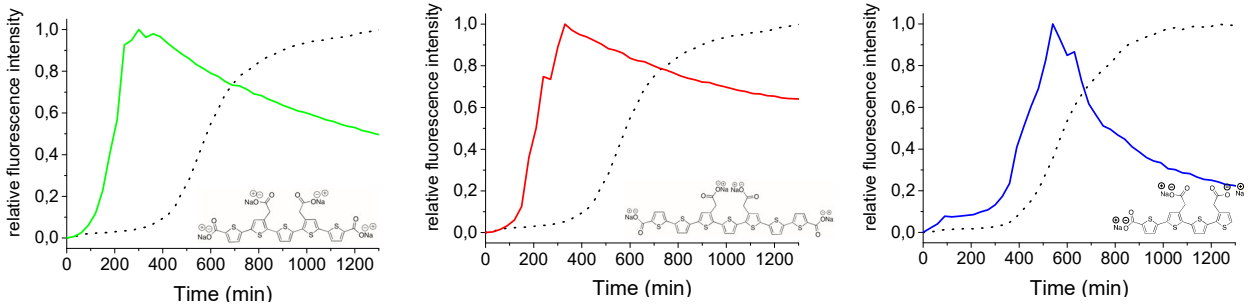


Magnusson et al *Prion 2014 15;8(3)*

Hyperspectral imaging in research

-discriminate between protein conformations at different time points

time

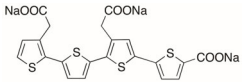


Klingstedt et al *Organic & biomolecular chemistry 2011 9*, 8356-8370

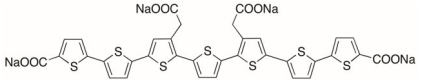
Amyloid maturation

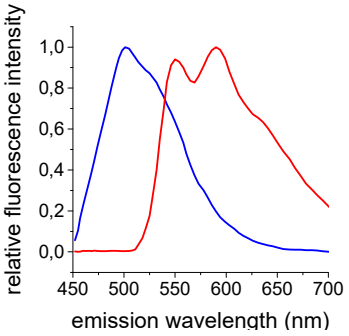
-in vivo observation

qFTAA

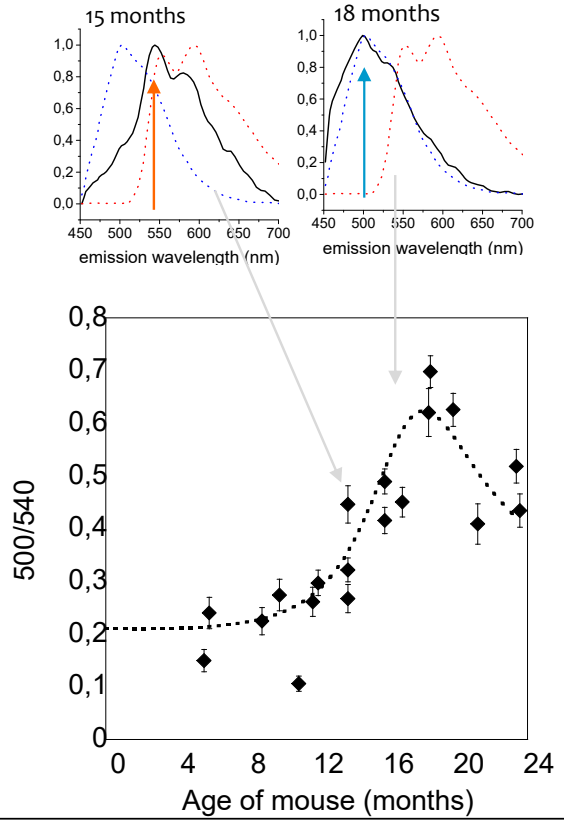


hFTAA





APP/PS1 mice overexpressing Aβ1-42



Nyström et al *ACS Chem biol 2013 8 (6), 1128–1133*

Amyloid maturation

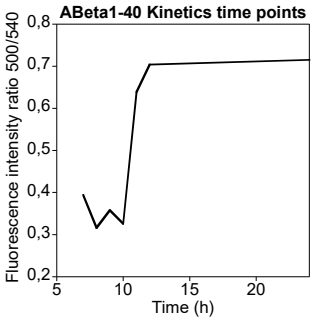
-in vitro characterization

Aβ1-40

10 µM (rPeptide) in PBS
@37 °C,
quiescent conditions

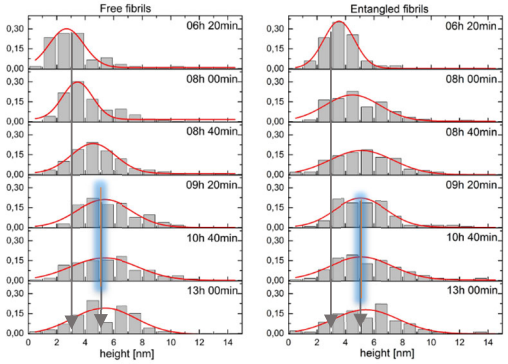
Fibril bundling over time increases qFTAA binding

Hyperspectral fluorescence imaging



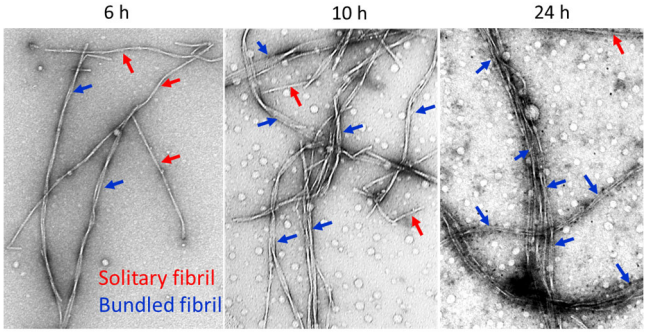
Spectral shift

AFM



Diameter ↑

TEM



Bundling ↑

LINKÖPING UNIVERSITY

Nyström et al *ACS Chem biol 2013 8 (6), 1128–1133*

Psonka-Antonczyk…Nyström Front Chem, 2016