

Invited Lecture
The 3rd Asian Conference on Chemosensors and Imaging Probes
(AsianCHIP-2019)

Molecular Engineering of Xanthene Dyes

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The serendipic synthesis of Mauve by the 18-year-old William H. Perkin signified the birth of fine chemical industry. Besides their traditional uses in dyeing textiles, furs, leathers, papers and biological tissues, they were also the cornerstones of as-of-that-time cutting-edge technologies, textile whitening, paper brightening, color photography, chemotherapies, dye lasers, optoelectronics, sensing and information storage.

Recent years, there's a surging demand for novel functional dyes from the biomedical fields, e.g. fluorescent probes for biosensing/diagnosis/guided surgeries, switchable dyes for super-resolution microscopy, near-infrared dyes for *in vivo* fluorescence/photoacoustic imaging and photo-thermal ablation, photosensitizers for photo dynamic therapy, photo-triggers for optogenetics/drug-release, FRET pairs for DNA sequencing etc.

Development of high-performance small-molecule dyes by molecular engineering of xanthene scaffold *to meet the existing demand from the allied fields*, and *to spark novel technologies* has been the goal of my research group. Some recent progresses include: 1) highly sensitive Hill-type pH probes, 2) stable deep NIR absorbing/emitting fluorophores, 3) diversity-oriented library for potent hits against drug-resistant pathogens, 4) photo-triggered and photo-calibrated donors of NO and CO respectively.

Currently, we have an intense interest in rational design of multiple fluorophoric systems, which can potentially render facile applications harnessing multi-extonic photophysical processes, e.g. FRET, singlet-fission, and excimer formation. An on-going project involves synthesis of a spiro-linked FRET pair, which is capable of monitoring molecular tumbling and orientation of biomacromolecules. Also, we discovered that spiro-conjugated FRET pairs are viable chemical space for high-performance singlet-fission materials, which can potentially promote the maximum efficiency of single-junction solar cells beyond the Shockley-Queisser limit.

References:

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Bio-Sketch of the Speaker

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Professional experience

2015-now	Professor,	ECUST
2010-2015	Associate Professor,	ECUST

Education

2007-2010	Postdoc	University of Texas at Austin	Prof. Eric V. Anslyn
2002-2007	Ph.D.	Louisiana State University	Prof. Robert M. Strongin
1997-2002	B.S.	University of Science and Technology of China	

Honors and awards

2018	Excellent Young Scholar, NSFC
2018	MSMLG Emerging Investigator Award, MSMLG2018 at Dalian
2017	The Presidential Award, ECUST
2014	University Teaching Award for Graduate Education, ECUST
2013	Shanghai Rising-Star talent award, Shanghai Municipal Science and Technology Commission
2012	Junior Faculty Award, School of Pharmacy, ECUST
2012	Tianding-Dongyue Award for Teaching, ECUST
2007-2010	Postdoctoral Fellowship from Henry Ford Hospital
2003	Teaching Award for General Chemistry Laboratory