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个人简介

国家杰出青年基金获得者，生物反应器工程国家重点实验室副主任。1990 年由湖北省黄冈中学考入清华大学生物科学与技术系，1995 年获得学士学位。1999 年获清华大学生物化学博士学位。毕业后赴美哈佛大学医学院进行金属硫蛋白的博士后研究工作。2002 年转至波士顿大学医学院，从事一氧化氮自由基生物学，巯基组学及心血管疾病的研究。2005 年成为哈佛医学院及其附属的 Brigham & Women’s 医院的生物化学副研究员及医学讲师。2006 年回国并被聘为华东理工大学药学院及国家生物反应器工程重点实验室特聘教授，从事合成生物学与光遗传学前沿技术发展与应用研究。2006 年入选教育部新世纪优秀人才计划，2007 年入选上海市浦江人才计划，2008 年获得上海市高校特聘教授称号，2011 年获上海市曙光学者称号，2014 年入选上海市优秀学术带头人计划。2012 年获国家杰出青年基金资助。2014 年入选科技部中青年科技创新领军人才。现任中国生物化学与分子生物学会理事，中国生物化学与分子生物学会酶学专业委员会常务副主任，上海市细胞生物学学会副理事长。

主要研究对象为利用合成生物技术与光遗传学技术控制与监测细胞内分子过程；癌症及代谢类疾病药理及药物筛选技术；蛋白质特异性标记、翻译后修饰的鉴定、与细胞内原位成像；蛋白质药物生产技术。在华东理工大学工作期间，建立了针对蛋白质二硫键与相邻巯基的荧光探针及原位与活细胞成像技术，揭示了线粒体对这些巯基修饰形式的调控作用，进而发展了高效表达药用蛋白的基因表达系统；发明了一系列特异性检测细胞内核心代谢物 NADH、NADPH 的基因编码荧光探针 Frex、SoNar 与 iNaps，实现了在活体动物及活细胞各亚细胞结构中对细胞代谢的动态检测与成像，进一步利用这些探针发现了高效选择性的抗癌药物，揭示了其机制；发明了简单实用的 LightON 动物细胞光控基因表达系统，首次实现了光对哺乳动物组织内基因表达的控制。这些研究成果以通讯作者或第一作者身份发表在 Nature Methods、Nature Protocols、Cell Metabolism、Cell Research、Angew. Chem.、PNAS 等一流杂志。这些研究成果也受到了许多国际同行的关注。目前已有全球有近 600 余实验室使用我们发展的各种前沿研究技术进行研究，其中哈佛大学、京都大学等科学家的应用我们技术的研究成果已经发表于 Science 等一流期刊。

研究方向

1. Genetically encoded sensors for cellular metabolites and life activities. We are currently developing protein based sensors by fusion of fluorescent proteins and specific sensing domains. These sensors may be used conveniently for monitoring various intracellular events. Particularly, we have recently obtained highly responsive NADH, glucose and cAMP sensors for live cell imaging.

2. Small molecular fluorescent probes for specific labeling and imaging of protein thiol post translational modifications, including protein S-nitrosation, disulfides, sulfenic acid and vicinal dithiols. We developed new fluorescent imaging methods for cellular protein disulphide, S-nitrosation, sulfenic acid and vicinal dithiols. Ongoing studies include regulation of protein thiol proteome and their functional implications.

3. Optogenetics modules and circuits. We are currently developing synthetic proteins which are activated by light. These proteins may be used for control of gene expression, enzyme catalysis and labeling of live cells and animals in a spatiotemporal manner.

4. High content, high throughput genetic and drug screening. Our new methodologies make it possible to identify genes and chemicals that regulate global cellular metabolism in a large scale. These genes and chemicals have the potential to be used in disease diagnosis and treatments.

5. Protein expression systems and bio-manufacturing technologies. We are currently working on next generation bioreactor technologies with improved efficiency and reduced emission.

研究成果及主要发表文章

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