

Research Profile

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**SUMMARY OF MY RELEVANT RESEARCH AREAS:****Brief summary of your research areas, in English**

Synthesis and characterization of Cyclodextrin Nanosponges and co-polymer, Synthesis and stability enhancement of Cyclodextrin metal organic frameworks, High-throughput method for drug-CD interaction measurements including, HPAC, SPR, SPRI and Molecular docking. Small molecule microarray, protein microarray, drug screening.

Brief summary of your research areas, in Chinese

环糊精纳米海绵和共聚物的合成和表征，环糊精金属有机骨架的合成和稳定性的增强，高通量方法测量药物-CD 的相互作用，包括 HPAC, SPR, SPRI 和分子对。小分子微阵列，蛋白质微阵列，药物筛选。

Primary Research interests: *Dr. Vikramjeet Singh has done his Ph.D. from National Center for Nanoscience and Technology, Beijing and currently working as postdoc researcher in Shanghai Institute of Materia Medica in Prof. Jiwen Zhang's laboratory. His main research projects include:*

Cyclodextrin nanosponges (CD-NSPs): Besides conventional β -CD-NSPs, the NSPs of α , γ , HP- β , Methyl- β , and SBE- β cyclodextrins were synthesized by a simple modified approach and thoroughly characterized. The control of CDs derivatization over structural dimensions and properties was investigated. Furthermore, CD-NSPs were used for the solubility enhancement of artemether and paclitaxel drugs.

Cyclodextrin co-polymer synthesis: Co-polymer of CD and sialic acid for target drug delivery and surface modification of CD-NSPs with cholesterol and sialic acid for enhanced cellular penetration.

Cyclodextrin metal organic frameworks (CD-MOFs): The major focus of his current research is to improve the stability of moisture sensitive CD-MOFs. Due to fast disintegration of γ -CD-MOFs structure when exposed to humid conditions due to weak coordination bond of γ -CD and alkali, the application in pharmaceutical area remained impractical. Hence, the stability improvement of CD-MOF is highly needed to explore the use of these special materials. Two diverse approach using cholesterol coating and cross-linking have developed for the stability enhancement of CD-MOF.

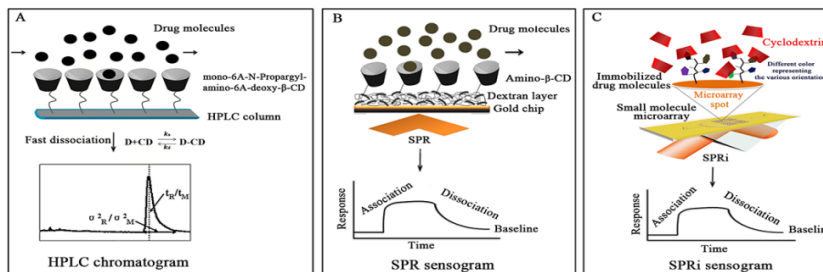
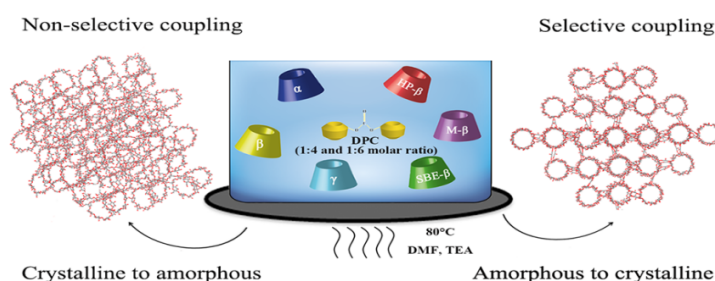
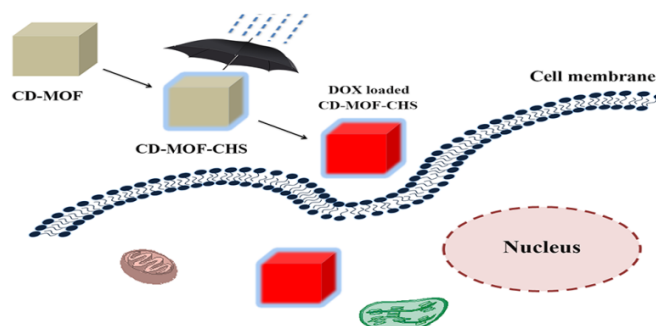
HTS method Drug-Cyclodextrin interaction measurement: The one part of research is to measure kinetic constant of drug-cyclodextrin interaction using small molecule microarray in combination with surface plasmon resonance imaging technique. Thousands of drugs were printed in microarray format for interaction measurements with 5 different CDs.

Topics in which you would like to develop collaborative research:

Mainly interested in research and development of materials including, Cyclodextrin Nanosponges, Cyclodextrin co-polymer, Metal organic frameworks (MOFs) for the purpose of drug delivery and material improvement. Measurements of drug-cyclodextrin interaction kinetics using HPAC, SPR, SPRI and molecular docking for enhancement in stability, solubility and bioavailability of various drugs.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

Cyclodextrins metal organic frameworks projects with University of Paris Sud, Paris; France. University of Bradford, United Kingdom; Shenyang Pharmaceutical University (SPU); Jilin University, Changchun, China; Fudan University, Shanghai, China.

Relevant graphics, figures, pictures:**Three method used for the drug-CD interaction measurements****Crystallinity control over cyclodextrin nanosponges using derivative cyclodextrins****Moisture resistant CD-MOF with high cell penetration****Publications and other outputs relevant to your interest in this programme**

- V. Singh, Z. Li, X. Zhou, X. Xu, J. Xu, A. Nand, H. Wen, H. Li, J. Zhu and J. Zhang*. High-throughput measurement of drug-cyclodextrin kinetic rate constants by small molecule microarray. RSC advances, 2016, 6, 3213-3218.
- V. Singh*, A. Nand and Sarita. Universal screening platform using three-dimensional small molecule microarray based on surface plasmon resonance imaging. RSC advances 2015, 5, 87259 - 87265.
- V. Singh, A. Nand, C. Chen. Z.P. Li, S.J. Li, S. Wang, M. Yang, A. Merino, L. Zhang, J. Zhu*. Echinomycin, a potential binder of FKBP12 shows minor effect on calcineurin activity. Journal of biomolecular screening, 2014, 19, 1275, 1281.
- J. Xu[#], V. Singh[#], X. Yin, P. Singh, L. Wu, X. Xu, T. Guo, L. Sun, S. Gui, J. Zhang*. Solvents effects on crystallinity and dissolution of β-artemether. Drug Delivery and Industrial Pharmacy (Revised).
- V. Singh, A. Nand, C. Chen. Z.P. Li, S.J. Li, S. Wang, M. Yang, A. Merino, L. Zhang, J. Zhu*. Echinomycin, a potential binder of FKBP12 shows minor effect on calcineurin activity. Journal of biomolecular screening, 2014, 19, 1275, 1281.