

2011 中技社科技研究獎學金

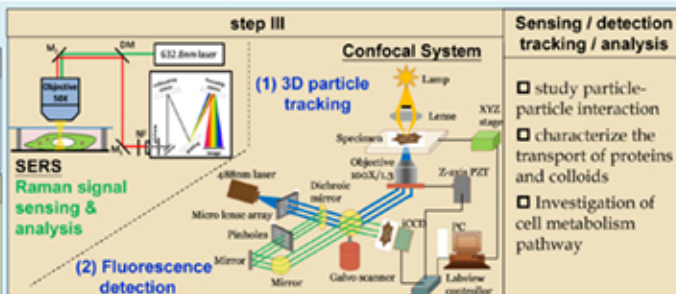
CTCI Science and Technology Research Scholarship

<高深寬比表面增強拉曼散射奈米粒子之製造應用於活體細胞內拉曼散射觀測>

研究摘要 本研究提出了以表面官能基作為奈米遮罩的方法，於電漿環境下蝕刻聚苯乙烯小球表面以形成奈米柱狀結構之製程，在此粗糙化表面沉積一金屬層後，將賦予表面電漿共振的能力，傳遞與累積電場強度於粗糙化處理的位置(hotspot)。而當分子接近此hotspot位置，將可大幅提升此分子 10^{16} 倍的平均拉曼散射強度。期將此粒子以胞飲方式送入癌細胞，以供未來活體細胞內拉曼訊號的觀測。由於該粒子本身具備螢光特性，因此在細胞內可藉由螢光觀測位置，來進行生醫感測的活細胞實驗。

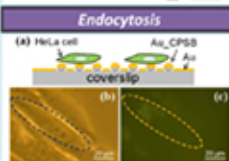
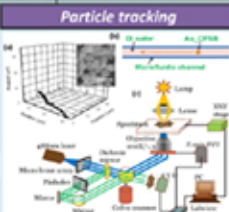
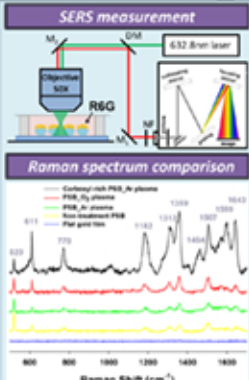
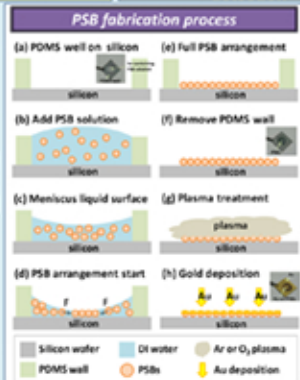
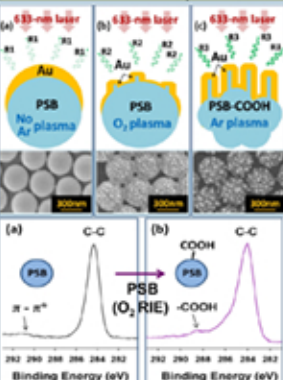
研究成果

step I	NPs design/fabrication
PSBs	<input type="checkbox"/> fluorescence <input type="checkbox"/> w/ functional group <input type="checkbox"/> SERS-active
step II	NPs transmembrane
HeLa	<input type="checkbox"/> endocytosis <input type="checkbox"/> nano-needle injection or delivery



Sensing / detection tracking / analysis

- study particle-particle interaction
- characterize the transport of proteins and colloids
- Investigation of cell metabolism pathway



Publication 1. Yu-Wei Huang, Shih-Mi Liu, Yan-Ju Chang, Hsiao-Yi Hsieh, Chun-Ying Tai, Yu-Tzu Huang, Ulfar Mirsaidov, Paul Mutsaers, Fan-Gang Teng, Chia-Shen Chang and Yu-Ting Chen, "Self-Aligned Wet Cell for Hydrated Microbiology Observation in TEM" Lab on a Chip, 2011 (accepted), [linking: 1/71 in BIOCHEMICAL RESEARCH METHODS, SCI, Impact Factor = 4.260].
 2. Hsiao-Yi Hsieh, Yan-Ling Kuo, Chau-Huang Liao, Tzu-Wen Huang, Chung-Shi Yang, Fan-Chang Wang, and Fan-Gang Teng, "Au-Coated Polystyrene Nanoparticles with High-Aspect-Ratio Nanostructures via Surface Carbonization-Shielded Anisotropic Etching for Significant SERS Signal Enhancement," The Journal of Physical Chemistry C, 2011, 115, pp 10258-10267, [linking: 2/722 in MATERIALS SCIENCE, MULTIDISCIPLINARY, SCI, Impact Factor = 4.520].
 3. Hsiao-Yi Hsieh, Fan-Chang Wang, Chun-Lung Wu, Chi-Wen Huang, Ching-Chang Chiang, and Fan-Gang Teng, "Reflective Enhancement of Fluorescence Detection Efficiency in Protein Microarray Assays: Application of a Highly Fluorinated Organosilane on the Blocking Agent on the Background Surface by a Facile Vapor-Phase Deposition Process," Analytical Chemistry 2009, 81, pp 7908-7916, [linking: 3/71 in ANALYTICAL CHEMISTRY, SCI, Impact Factor = 5.874].

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