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FLUORESCENT NANOPROBES FOR RAPID BIOMARKER MRNA DETECTION AT SINGLE CELLS

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Cancer is the second leading cause of death globally and a tremendous burden on society. Despite the existence of screening and biopsies, the lack of sensitive and affordable tools for early diagnosis and prognosis of cancer remains key obstacles to reducing cancer mortality. We have developed a new nanoprobe for high throughput, sensitive cancer biomarker mRNA analysis at single cell level to facilitate rapid cancer detection. This nanoprobe is based on single strand DNA functionalized gold nanorods that register the target cancer biomarker mRNA in single cells via fluorescence intensity and lifetime, facilitating downstream tumour cell differentiation via flow cytometry. 1-5 Nanoprobes targeting cancer oncogenes, such as c-myc and sox2, have been designed and demonstrated with high binding specificity to target through fluorescence spectroscopy in solution phase and through flow cytometry in various cell lines. Furthermore, the ability of the nanoprobe to detect cancer cells in co-culture with high concentration of non-cancer cells has been demonstrated. This proves the principle and demonstrates the potential of nanoprobe as a diagnostic tool against a range of mRNA biomarkers to detect tumour cells in liquid biopsies including belly/pleural effusion and blood.

Biography

Dr. Chen is a Reader at Strathclyde University. She received a PhD in physics from Birmingham University in 2000. Her main research activities lie in the creation and characterization of nanoscale structures for their unique physical and chemical properties. Her recent research focuses on fluorescent nanoclusters, nanoprobe, plasmonic effects from noble metal nanoparticles, arrays and porous media, as well as nanoparticle-cell interaction and cytotoxicity. She works in multidisciplinary research in the interface of nanotechnology and healthcare aimed at utilizing nanostructures for enhanced biomedical imaging and sensing. Dr. Chen has 80 publications including five invited reviews, book chapters and has one patent application. She is a fellow of the Royal Microscopy Society, a member of the Institute of Physics and American Chemical Society. She served as an expert panel member for the European cooperation in Science and Technology – domain committee Materials, Physical and Nanosciences, chairs, invited speakers and member of organizing committee in international conferences and workshops.

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