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Funded by a Metals in Biology BBSRC NIBB Business Interaction Voucher
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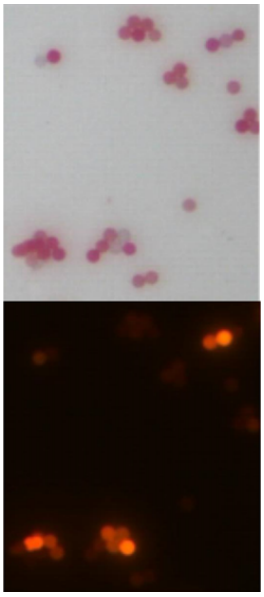
Metals IN BIOLOGY

Maximising biomarker detection sensitivity through metal-enhanced fluorescence

"With the expertise of the University of Manchester we have been able to add visible dyes to particles while retaining fluorescent signaling conjugated to the particle surfaces." Aeirtec Ltd

Lu Shin Wong, University of Manchester
Stephen Kilfeather, Aeirtec Ltd



OUTCOMES: This business interaction voucher was used to develop a collaborative relationship related to the production of protein—metallic nanoparticle conjugates that could be used in Aeirtec's multiplex immunoassay assay platform. The BIV was used to part-fund research by an MSc students and two undergraduate summer internships working in Lu Shin Wong's lab. The study focused on the bioconjugate chemistries for linking dyes, proteins and metallic nanoparticles to each other. Comparative analyses were conducted with several diamine linker molecules using a variety of protecting groups. Robust and quantifiable bioconjugate chemistries were developed and delivered to Aeirtec.

Visible dyes (top image) can be added to particles while retaining fluorescent signaling (bottom image)

INITIAL AIMS: Fluorescence-based immunosorbent assays are a key technology for measuring microbial contamination and molecular biomarkers. Typically, these assays use an immobilised antibody to capture the target molecule from the test sample, followed by the immobilisation of a second antibody bearing a fluorescent label. Metal-enhanced fluorescence (MEF) — where the second antibody is co-localised with a metallic nanoparticle — could improve diagnostic sensitivity. This project aims to improve the sensitivity of MEF-based assay systems by applying tailored bioconjugation methods to control the orientation of the immobilized antibodies with respect to the nanoparticle.

- **Robust and quantifiable bioconjugation methods delivered to industrial partner**
- **BBSRC iCASE PhD studentship awarded**

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