King's College and ZiNIR chip in to design novel imaging system

Business interaction voucher funding from the Metals in Biology BBSRC NIBB has enabled King's College London and technology development company ZiNIR to collaborate on the design of a novel ultra-compact imaging system. Such an imaging modality might be used to assess the vitality of biofuel crops in the field as well as other industrial biotechnology applications.

The project brought together the expertise of Po-Wah So, from Kings College London, who researches the MRI-based detection of iron in biological and pathophysiological processes, with ZiNIR's capabilities in photonics research.

The aim of this collaboration was to identify the technical specifications of an ultra-compact, hyperspectral fluorescence (that is, fluorescence across the electromagnetic spectrum from ultraviolet to long-infrared) imaging instrument that is capable of simultaneously sensing the fluorescence signature of a range of biomolecules.

Ian Goodyer from ZiNIR explains, "imaging of biological molecules that contain metal ions has a number of uses, ranging from industrial biotechnology through to biomedical applications such as the diagnosis of Alzheimer´s disease."

One potential application of such imaging in industrial biotechnology is the monitoring of chlorophyll fluorescence — which is highly sensitive to changes in the efficiency of photosynthesis — as an indicator of the vitality and growth rate of biofuel crops.

To identify the technical specifications, the collaborators conducted a literature review of the current status of MRI-optical dual imaging instruments, their applications and associated challenges, together with a patent search for fluorescence imaging systems.

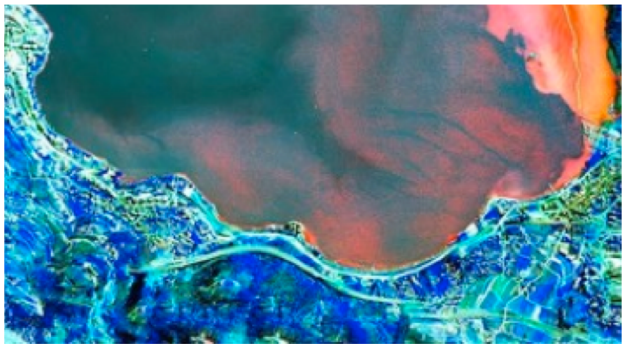
"The literature and patent search identified number of parallels between the requirements for fluorescence imaging in plants and in preclinical experimental studies," highlights Po-Wah. "A set of technical specifications for the imaging system was defined to satisfy the requirements of both application areas," she says.

Since ZiNIR has designed a novel semiconductor chip-based spectrometer that can detect multiple wavelengths simultaneously, an ultimate aim would be to develop such a device using use ZiNIR's chip technology that could be incorporated into an MRI imaging system. This would have the advantages of being small and easily transportable.

Joanna Coote, who worked project for ZiNIR said "This has been a fascinating project that generated a great many ideas for further development of the proposed system. I look forward to a further collaboration with Po-Wah on a longer and more in-depth project."

Manuscript: Walker et al (2016) Aging 8: 2488-2508

For more information contact po-wah.so@kcl.ac.uk



"Imaging of biological molecules that contain metal ions has a number of uses, ranging from industrial biotechnology through to biomedical applications including identification of novel therapies to treat Alzheimer´s disease."