RESONANCE MICROWAVE SENSING OF HEAVY METALS AND CHEMICALS IN WATER

Microwave sensing is based on sending interrogating electromagnetic signal towards the water sample/ flow and collecting the scattered response signal. The scattered signal contains information on the physical and chemical properties of the water sample or continuous water flow. Contaminant concentration can be analysed in real time using mathematical data processing.
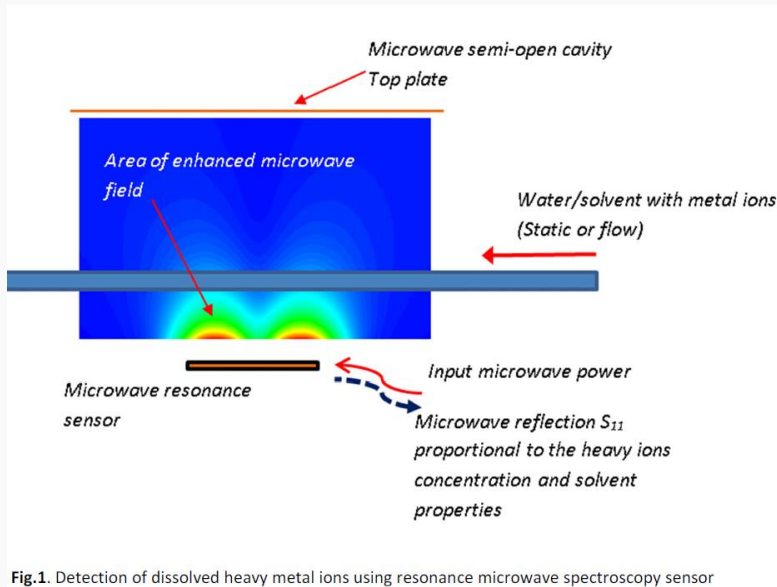

Fig.1. Detection of dissolved heavy metal ions using resonance microwave spectroscopy sensor

BENEFITS

➢ Non-contact, non-invasive technology

➢ allows very high dynamic resolution: *typically, 1dB amplitude contrast per 1ppm of a contaminant*

➢ very robust, real-time tool with acquisition time of few milliseconds

➢ suitable for the detection of a wide range of metals and chemicals

➢ allows water contamination detection in optically opaque flow

➢ portable (size approx. 5 square cm or less), simple form-factor

➢ intrinsically radiation-safe and relatively inexpensive

➢ does not require operator expertise in the field of microwave engineering

➢ can be integrated with smartphones and iPads

THE TECHNOLOGY

This innovative sensing technology combines the unique property of microwaves to interact very strongly with water and different contaminant materials and mathematical data processing enabling accurate non-invasive characterization of physical and chemical structure of water sample.

The technology is based on resonant interaction of microwaves with water sample which is facilitated by the resonance microwave sensor antenna developed recently by my team.

Real-time data processing allows accurate detection of water contamination at sub-ppm level, depending on the water sample physical and chemical composition. Microwave technique can be combined with optical spectroscopy to achieve even higher accuracy than is possible with optical and microwave spectroscopic methods applied alone.

Contacts: Dr Oleksandr Malyuskin malyuskin@yahoo.co.uk + 44 7840757241