Contribution ID: **411** Type: **Oral Presentation**

Development of an Integrated Biofilm NMR Microplastic Sensor for Agricultural Water Monitoring

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A laboratory investigation aimed at understanding the interaction between model environmental biofilms and water quality contaminants such as metals and microplastics is developed. Microbial biofilms can adsorb and retain water-born contaminants in their matrix of extracellular biopolymers, which form a hydrogel called EPS, and therefore have potential to capture evidence of transient contamination events in surface and irrigation waters. Metals, like copper and lead, as well as microplastics are contaminants of emerging concern and pose risks to the safety of the food supply when they appear in irrigation water. Each of these contaminants is also visible using nuclear magnetic resonance (NMR) relaxometry. Metals in water cause changes in NMR signal relaxation; microplastics have different signal relaxation properties than water and interact with the water molecules in biopolymer crosslinking, which are detectable by relaxometry and magnetic resonance imaging (MRI) experiments. Laboratory experiments using two model biofilms –sodium alginate beads and a multispecies biofilm, aerobic granular sludge, to assess sorption and evolution of target contaminants are undertaken. The novel data obtained can be integrated with low field NMR sensors in the field to aid in the detection of diverse contaminants in water supply and irrigation systems, potentially including transient contamination events.

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References

Primary author: Prof. SEYMOUR, Joseph (Montana State University)

Co-authors: Dr STANLEY, Maribelle; YOUNG, Matthew (Montana State University); Prof. CODD, Sarah; KIRKLAND, Catherine (Montana State University)

Presenter: Prof. SEYMOUR, Joseph (Montana State University)

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