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# *Engineering*

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## Position #56; *Belinda Sturm*

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**Mentor name:** Belinda Sturm, Civil, Environmental, and Architectural Engineering

**Job/project title:** Fate of microplastics in wastewater and biological treatment of wastewater

### **Project description:**

Microplastics (plastics <5 mm) have become a major and growing global pollution problem. Water resource and recovery facilities (WRRFs) have been described as a point of source of microplastic contamination in water bodies. Through a preliminary study performed with high school teachers through an NSF Research Experience for Teachers (RET) grant, we have obtained preliminary data and estimates of microplastics discharge from wastewater treatment plants through effluent discharge and biosolids land application. The mass majority of microplastics are entrained within activated sludge and ultimately released to the environment through biosolids. We hypothesize that biofilm or fixed film systems with high EPS content will capture more microplastic. We will test this hypothesis by sampling full-scale WRRFs with a variety of treatment systems (with and without primary treatment and secondary treatment as suspended versus biofilm systems). We will also determine the effect of EPS on microplastic adsorption and retention efficiency within lab-scale and pilot-scale reactors and compare conventional and aerobic granular sludge processes for microplastic adsorption. Studies will also determine whether microplastics released into receiving water bodies form biofilm communities that are niche differentiated from activated sludge and serve as carriers for non-native communities into aquatic systems. Lastly, the environmental fate of microplastics land applied as biosolids will be tested in field plot studies at the KU Environmental Field Station. Based on the results, a holistic approach for microplastics management in WRRFs will be proposed.

### **Potential student tasks and responsibilities:**

Collection of wastewater samples from full-scale wastewater treatment plants

Digestion of wastewater samples to extract micro plastics

### **Student qualifications and characteristics:**

undergraduate taking Chem 150 or 135 or 175, pursuing an engineering degree or environmental science