**Could Fluorescence Tracking Distinguish Photo-resistant and Photo-labile Compounds Leached From Tire Particle Pollution?**

Ryan Spaulding, San Diego State University, San Diego, CA

**Abstract:**

Tire wear particles (TWP) pose a substantial threat to ecosystem health, as these tiny, abraded particles are washed away from roads and leach organic compounds into urban waterways. Many of the leached compounds are toxic and pose health risks to plants and animals alike. Fluorescence spectroscopy measures the fluorescent signatures of compounds and is a rapid technique to track the decay rates of the tire wear-derived compounds in water when exposed to sunlight. It has a distinct advantage over other techniques that are more time-consuming and expensive. Based on the tendency for sunlight to photo-oxidize compounds with more humic and aromatic structures, we hypothesize that photo-labile TWP compounds will have dominant fluorescence peaks in humic-like regions A and C, whereas more photo-resistant TWP compounds will have peaks in the protein-like fluorescence regions T and B. This information, if the hypothesis is substantiated by further experimentation, can be used to determine which compounds will persist and which will degrade when exposed to UV radiation based on their fluorescence peaks. In order to confirm this hypothesis, photo-resistantand photo-labile compounds known to leach from TWP were prepared in water or solvents, and three-dimensional fluorescence spectra were acquired for both types of compounds. Preliminary results indicate that 4 photo-labile compounds, such as 6PPD, the precursor to the well-known compound 6ppd-quinone, which has been linked to fish mortality in Pacific Northwest streams, all had peak excitation wavelengths > 300 nm and peak emission wavelengths > 400 nm, which thus far confirms the hypothesis. Only light absorbing compounds can undergo direct photolysis, and we expect that many of those will be fluorescent and amenable to this method. Yet, one limitation is that non-fluorescent compounds may be missed. Nevertheless, matching the photochemical degradation of organic compounds to their fluorescent peaks may serve as a rapid tool to screen the persistence of a solute when exposed to sunlight, and, in turn, its persistence in the environment.

**Biography:**

Third- year Environmental Engineering major at SDSU.