

## Filtering Out Pesky Air Pollutants with X-Ray Fluorescence

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### Abstract

Air pollutants are so small they evade most filters, but nature contains air filters that catch pollutants naturally: spider webs. As an insect flies, it may appear to fly into a spider web, when in actuality, it is pulled into the web due to an electrostatic attraction [1]. Similar to rubbing a balloon in your hair and then sticking it to a wall, an insect or air pollution particle obtains charge from air resistance and then induces a polarization in the water molecules adhered to the web. This polarization is what attracts the insect or air particle to the web and a glue-like substance then causes them to stick [2]. Webs were collected from different environments around Dahlenega and x-ray fluorescence (XRF) was used to identify different elements in the web. XRF works by exciting atoms with primary x-ray radiation that then emit secondary x-rays characteristic to the emitting elements. These characteristic x-rays are detected and the elements that emitted them are identified. Several different elements, such as iron, manganese, lead, and many more, have been detected, with webs taken from high traffic areas having higher concentrations and a greater diversity of these elements than webs collected from lower traffic areas. Using spider webs as air filters, any place in the world - as spider webs are everywhere- can have an accurate and inexpensive measurement made of the air pollutants.

[1] Ortega-Jimenez, Victor Manuel, and Robert Dudley. "Spider Web Deformation Induced by Electrostatically Charged Insects." *NatureScientific Reports*.3 (2013): 1-4. *Nature.com*. Web. Sept. 2014.

[2] Dr. Michael Bodri. University of North Georgia. September, 2014.