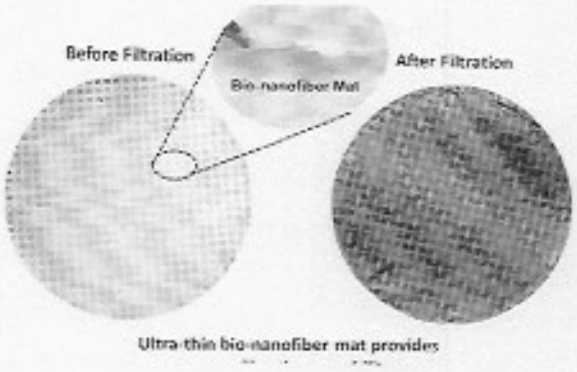
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Environmentally-friendly soy-based filter can capture toxic chemicals that other filters can't

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Before and after demonstration of filter's ability. Credit: WSU

Washington State University researchers have developed a soy-based air filter that can capture toxic chemicals, such as carbon monoxide and formaldehyde, which current air filters can't.

The research could lead to better air purifiers, particularly in regions of the world that suffer from very poor air quality. The engineers have designed and tested the materials for the bio-based filter and report on their work in the journal *Composites Science and Technology*.

Working with researchers from the University of Science and Technology Beijing, the WSU team, including Weihong (Katie) Zhong, professor in the School of Mechanical and Materials Engineering, and graduate student Hamid Souzandeh, used a pure soy protein along with bacterial cellulose for an all-natural, biodegradable, inexpensive air filter.

Hazardous gases escape most filters

Poor air quality causes health problems worldwide and is a factor in diseases such as asthma, heart disease and lung cancer. Commercial air purifiers aim for removing the small particles that are present in soot, smoke or car exhaust because these damaging particles are inhaled directly into the lungs.

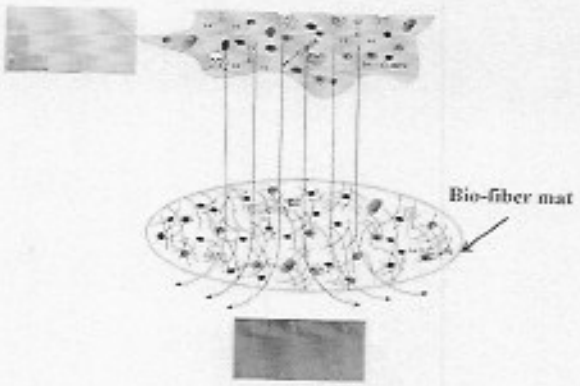
With many sources of pollution in some parts of the world, however, air pollution also can contain a mix of hazardous gaseous molecules, such as carbon monoxide, formaldehyde, sulfur dioxide and other volatile organic compounds.

Typical air filters, which are usually made of micron-sized fibers of synthetic plastics, physically filter the small particles but aren't able to chemically capture gaseous molecules. Furthermore, they're most often made of glass and petroleum products, which leads to secondary pollution, Zhong said.

Soy captures nearly all pollutants

The WSU and Chinese team developed a new kind of air filtering material that uses natural, purified soy protein and bacterial cellulose - an organic compound produced by bacteria. The soy protein and cellulose are cost effective and already used in numerous applications, such as adhesives, plastic products, tissue regeneration materials and wound dressings.

Soy contains a large number of functional chemical groups - it includes 18 types of amino groups. Each of the chemical groups has the potential to capture passing pollution at the molecular level. The researchers used an acrylic acid treatment to disentangle the very rigid soy protein, so that the chemical groups can be more exposed to the pollutants.



WSU's new soy-based filter is able to capture challenging pollutants from the atmosphere. Credit: WSU