

Opportunity

Seeking a licensing and development partner to bring this system to market for inhalation toxicology and respiratory research applications.

Development Stage

Prototype built and tested in the lab

Intellectual Property

Non-Provisional
Patent Application Filed

Publication

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A simulated respiratory system for secondhand smoke generation

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PROBLEM STATEMENT

Secondhand smoke from cigarettes and electronic cigarettes poses risks to non-smokers' health and the environment. Studying this smoke has traditionally involved asking human subjects to smoke and exhale under observation. This approach is invasive and produces data that are difficult to reproduce. Researchers need a reliable way to generate representative secondhand smoke without relying on human test subjects.

SOLUTION

Researchers at Missouri University of Science and Technology built a simulated respiratory system that recreates how smoke moves through a human lung. The system passes primary aerosol through a series of filter media that represent the extrathoracic, tracheobronchial, and alveolar regions of the respiratory tract. The secondhand aerosol that exits the final filter behaves like smoke exhaled by a smoker. In testing, the system's particle deposition efficiency remained within 10% of the values predicted by the International Commission on Radiological Protection human lung model across particle sizes from 30 to 500 nanometers.

VALUE PROPOSITION

This system gives researchers a repeatable, controllable way to produce secondhand smoke in the lab without human test subjects. Because its filter media closely match particle deposition behavior in the human lung, the secondhand aerosol it produces is representative of what a person exhales. Its simple structure makes it easy to build, control, and reproduce across studies of the health and environmental effects of both cigarette and electronic cigarette smoke.

