

U Tennessee's Essential N95 Mask Technology Protects Billions



Dr. Peter Tsai may not be a household name, but odds are you've come face-to-face with his work, particularly during COVID-19.

The University of Tennessee research professor created N95 respirators' essential technology. They have become vital in protecting frontline workers against COVID-19. The World Health Organization recommends them to protect against SARS, bird and swine flu, in addition to other airborne diseases like COVID-19, and the FDA, CDC, and OSHA also recommend N95s. Tsai's technology has also been widely used for over three decades in products such as HVAC filters and medical face masks. An estimated one billion people have used N95s to protect and improve their health.

In 1995, Tsai received five U.S. patents, including one for the corona electrostatic charging of nonwoven fabrics— the key technology in N95s. Tsai's novel method ionizes the neutral air with an electric field, generating ions and electrons which charge the nonwoven fibers through field and induction. This charged nonwoven fabric filters particles in the air ten times more efficiently than uncharged fabrics, without adversely increasing air resistance.

Though the patent for the original N95 filtration technology has expired, Tsai continues to improve the technology. Just last year, he developed a new approach to apply electrostatic charge to fabrics through friction. The resulting nonwoven fabric boasts a filter efficiency 20 times greater than that of untreated fabrics.

In a partnership with the university's tech transfer office, the University of Tennessee Research Foundation (UTRF), that spans more than 25 years, Tsai has 12 U.S. patents and more than 20 commercial license agreements.

With the onset of the coronavirus pandemic, UTRF has played an important role in connecting Tsai and his research to a growing number of facilities around the world; he has shared his expertise with many companies interested in producing the charged nonwoven fabric or in scaling up production.

"Dr. Tsai exemplifies how researchers can have a huge impact on bringing innovative products to market by making and maintaining valuable industry partnerships," said UTRF Vice President Dr. Maha Krishnamurthy. "His dedication to research and passion for the commercialization process have allowed him to partner with a variety of industry experts to respond to the increased demand for PPE (such as N95 respirators) during COVID-19."

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