

# TUBERCULOSIS AND LUNG DISEASE

September 20-21, 2017 | Philadelphia, USA

## Clog-free pocket-size ultrasonic nebulizer using multiple fourier horns-driven faraday waves

Chen S Tsai<sup>1</sup>, S C Tsai<sup>1</sup>, R W Mao<sup>1</sup>, K Shahverdi<sup>1</sup>, Y Zhu<sup>1</sup>, M Brenner<sup>1</sup>, G Boss<sup>1</sup>, S Mahon<sup>1</sup> and G Smaldone<sup>2</sup>

<sup>1</sup>University of California, USA

<sup>2</sup>State Univ. of New York, USA

Drugs designed to treat lung diseases or for systemic absorption through the lung require optimum particle (aerosol) size (2 to 6 $\mu$ m) to target delivery. Current advanced commercial ultrasonic nebulizers for pulmonary drug delivery utilize piezoelectric disk together with an active vibrating mesh or a passive screening mesh to produce medicinal aerosols. These devices produce aerosols with uncontrolled sizes and broad (polydisperse) size distributions. Furthermore, these devices are prone to clogging due to the mesh component of the design and overheating due to the high drive power required which make them unsuitable for administration of expensive medications. In this paper the scientific and technological innovations of the patented Faraday waves-based meshless ultrasonic nebulizers capable of producing optimum aerosol sizes are introduced first. Realization of a fully integrated clog-free pocket-size (14 x

6 x 3 cm<sup>3</sup>) nebulizer and applications to aerosolization of a variety of common pulmonary drugs and experimental drugs with desirable aerosol characteristics are then presented.

### Speaker Biography

Chen S Tsai is a Chancellor's Professor of the University of California at Irvine (UCI), received his PhD in Electrical Engineering from Stanford University in 1965. He joined Carnegie-Mellon University as Assistant Professor (1969), and was awarded Endowed Chair Professorship (1979). He joined UCI in 1980, and served as the Founding Director of the Institute for Applied Science and Engineering of Academia Sinica in Taiwan (1999-2002). He published 190 journal papers, 450 conference papers, and 14 encyclopedia and book chapters; received the 2013 IEEE UFFC Society Achievement Award with award citation. For pioneering contributions to the science and technology of integrated acousto-optics, ultrasonic monodisperse micro droplet generation, acoustic microscopy, and guided-wave magneto-optics and International Micro-Optics Award. He is Fellow Member of IEEE, OSA, AAAS, SPIE, Russian Popov Society, Academician of Academia Sinica, and a Foreign Member of Russian Academy of Applied Sciences.

e: cstsai@uci.edu

 Notes: