

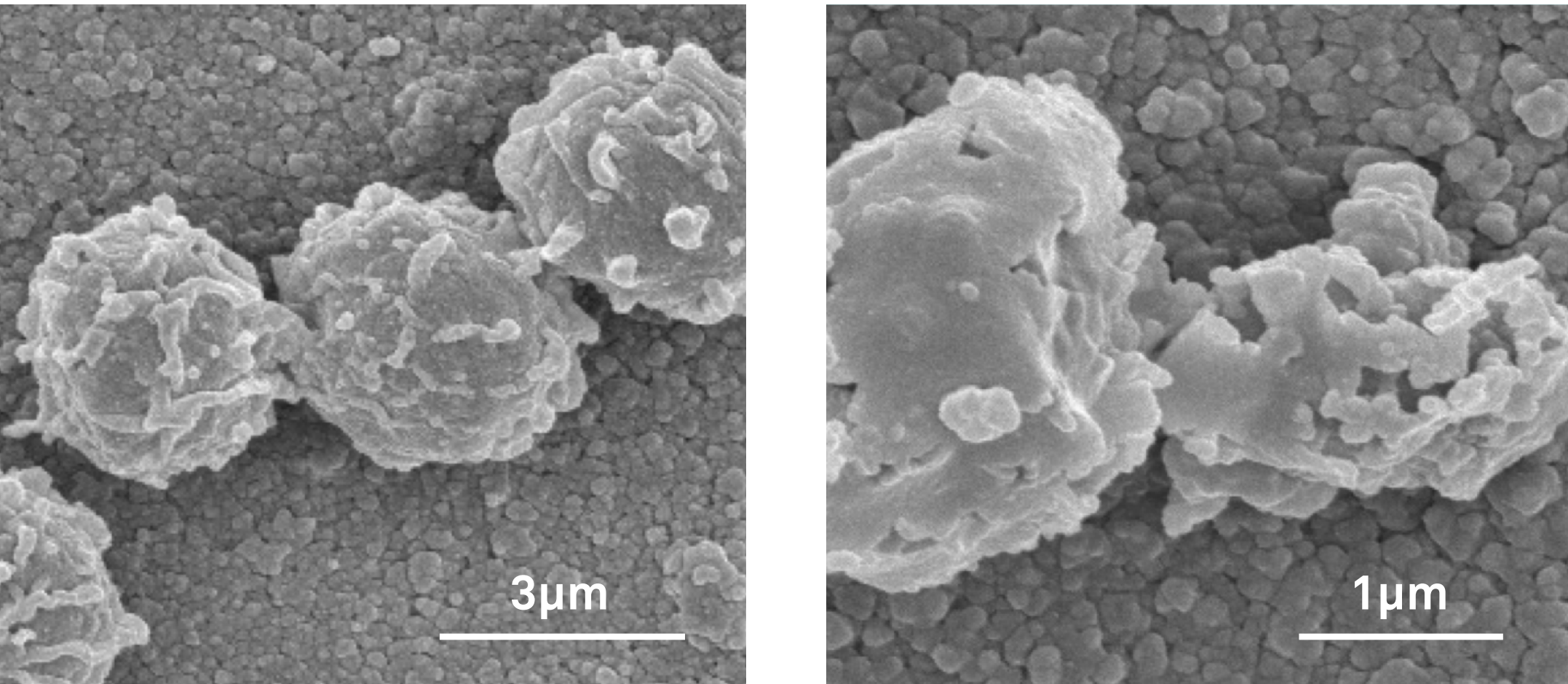
# Novel Photo-Electrochemical Oxidation Air-Purification Technology Reduces Asthma Symptoms

Nikhil G. Rao, MD<sup>1</sup>, Dharendra Y. Goswami, PhD<sup>2</sup>, Ambuj Kumar, MD/MPH<sup>2</sup>, Jenny S. Wong, MS<sup>1</sup>, Stephen B. Liggett, MD<sup>2</sup>

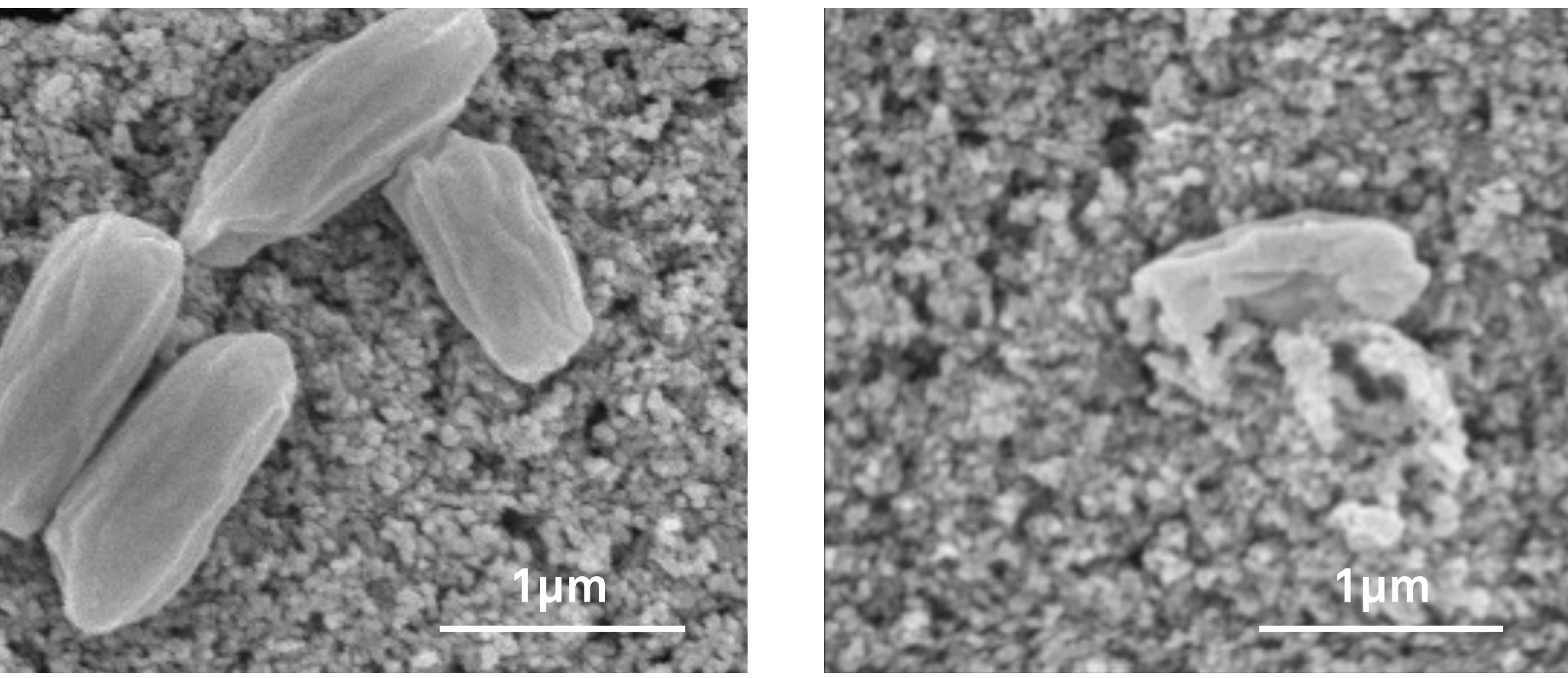
MOLEKULE **USF** UNIVERSITY OF SOUTH FLORIDA. Molekule, Inc.<sup>1</sup>, University of South Florida<sup>2</sup>

## Rationale:

Photo-electrochemical oxidation (PECO) is a novel air purification technology developed to reduce circulating air pollutants. In addition to physical filtration, a photo-electrochemical reaction takes place on the surface of a nano-coated filter leading to the oxidation of organic matter. PECO can destroy particulate matter as small as 0.1nm that would otherwise not trapped by a HEPA filter. We hypothesized that with daily use, the portable PECO device would reduce asthma symptoms after 4 weeks of use.



*Aspergillus Niger Spores Before*      *During Oxidation*



*Bacillus Subtilis Endospores Before*      *During Oxidation*

Scanning Electron Microscope images from Goswami, D.Y., 2003, “Decontamination of Ventilation Systems Using Photocatalytic Air Cleaning Technology,” ASME Journal of Solar Energy Engineering, 125:3, pp. 359-365.

## Methods

The study was performed among 18 individuals with self-reported asthma symptoms. Asthma symptoms were recorded on a 0 (minimum) - 4 (maximum) point scale at baseline and at 4 weeks with elements including daily puffs of inhaler, sleep quality, interference with daily activities and control of asthma as per the ATAQ scale.

Table 1. Participants Characteristics		
Variables	N (%)	
Gender		
	Female	11 (61.1)
	Male	7 (38.9)
Race		
	Asian or Pacific Islander	1 (5.5)
	Hispanic or Latino	2 (11.1)
	White/Caucasian	15 (83.3)
Asthma Medication Usage		
Yes		15 (83.3)
No		3 (16.7)

## Results

16/18 individuals (89%) provided all survey data at baseline and at 4 weeks. The mean age of the participants was 42 (Range 27-66). There was a statistically significant change in asthma symptoms from baseline to those seen at four weeks (2.06 at baseline and 0.75 post intervention) resulting in a mean difference of 1.31 (95% CI 0.45 to 2.18; p=0.006).

## Conclusions

With the use of PECO air purification technology self reported asthma scores decreased significantly. Future studies with increased patient numbers and objective asthma endpoints are planned to confirm these findings.

