Abstract Submitted
for the OSS12 Meeting of
The American Physical Society

Macrophages interaction with pulmonary surfactant using coherent anti-Stokes Raman scattering (CARS) microscopy MINETTE OCAMPO, DANA MARIE TELESFORD, HEATHER ALLEN, Ohio State University — Alveolar pulmonary surfactant, composed mostly of phospholipids, is essential for maintenance of normal lung function. However, increased production of lung surfactant can lead to many pulmonary inflammatory disorders. Alveolar macrophages are responsible for the degradation of the surfactant and exhibit increased lipid uptake in inflamated lungs. Owing to their limited clearance capability, excessive accumulation of surfactant may impair their phagocytic function. In this study, the interaction of the macrophages with different lipid components was studied using coherent anti-Stokes Raman scattering (CARS) microscopy. CARS microscopy, a nonlinear vibrational technique which combines spectroscopy and microscopy, allows noninvasive characterization and imaging of chemical species without preparation or labeling. A monolayer of THP-1 macrophages and palmitic acid-d_{31} on phosphate buffer solution was transferred to a coverslip using the Langmuir-Blodgett method and then imaged using CARS by mapping the CH_2 stretch signal of the lipid membrane of the macrophage and C-D stretch signal from palmitic acid-d_{31}. Preliminary results showed CARS images of the macrophage on the solid substrate and thermal degradation of the sample due to long exposure to high laser power. A contrast image is expected to be observed by mapping the CH_2 and C-D signals, which can show the lipid interaction and phagocytosis of the macrophage.

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Date submitted: 08 Mar 2012 Electronic form version 1.4