# HOLLOW FIBERS FOR ARTIFICIAL LUNG APPLICATIONS

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Artificial lungs are in use, but difficult issues remain in the field of membrane development related to fouling issues. Currently there are external artificial lungs circulating blood outside the body, taking out the carbon dioxide, and inserting oxygenated blood back into the body. An example of this type of machine is the ExtraCorporeal Membrane Oxygenation (ECMO) machine currently used in hospitals. The ECMO takes over the functions for both the lungs and the heart but is only available for short term use by patients with respiratory failure due to infections (1). The fibers in the machine develop fouling due to the fibers' small surface areas coupled with their long term exposure to proteins in the blood. These factors continuously decrease the gas transfer abilities of the fibers until the machine is no longer effective at exchanging gases with the blood. The goal of this research is to create a lung that can function within the body until an actual lung becomes available using hollow fiber membranes with proteins attached to prevent fouling. A fouling study was performed on 17.8% polysulfone hollow fiber membranes with polydopamine and peptoid attached. Unmodified, polydopamine modified, and polydopamine and peptoid modified fibers were placed in a diffusion chamber with Bovine Serum Albumin (BSA) flowing on the outside of the fibers and oxygen flowing on the inside. Evapoporometry was run on the fibers to determine the pore size distribution of the fibers before and after the run. The evapoporometry of the fibers shows that the pores for the fibers after 48 hours in the chamber are smaller overall with a few larger pores from oxygen flowrate being too high, tearing the pores. There were also fewer pores overall in the fibers after the run; therefore, the fibers are fouling in the diffusion chamber. The oxygen concentration of the BSA was also measured while the BSA was run outside of the fibers in the chamber. The fibers were considered to be completely fouled when no more oxygen was able to diffuse into the BSA. The fouling was shown to take longer to occur in the protein coated fibers than in the unmodified fibers.

Reference:
(1) Downs, M. (2014, October 18). *Artificial Lung Closer to Clinical Trial*. Retrieved from WebMD: http://www.webmd.com/lung/features/ar tificial-lung-closer-to-clinical-trial.