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**Session Title:** Platform BH: Membrane Structure, Rafts, Domains and Phase Separation  
**Presentation Number:** 2691-Plat  
**Abstract Title:** Neutron Diffraction Studies of Lipopolysaccharide Bilayers  
**Presentation Start/End Time:** Wednesday, Feb 06, 2008, 10:45 AM -  
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**Topic:** 3E Membrane Structure  
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Lipopolysaccharides (LPS) are a major class of macromolecules populating the surface of Gram-negative bacteria. They contribute significantly to the bacterium's surface properties and play a crucial role in regulating the permeability of its outer membrane. We report on neutron diffraction studies performed on aligned, self-assembled bilayers of LPS isolated from *Pseudomonas aeruginosa* PAO1. This LPS system comprises of a mixture of rough and smooth A-band and B-band LPS, similar to that naturally found in *P. aeruginosa*. From the construction of one-dimensional scattering length density profiles, we found that water penetrates into the hydrocarbon region up to and including the center of liquid crystalline Na<sup>+</sup>-LPS bilayers. This permeability to water also extends to bilayers in the continuous phase transition region and could have far-reaching implications as to how small molecules penetrate the outer membrane of Gram-negative bacteria. Most recently, we have studied the permeability of LPS bilayers to water in the presence of Mg<sup>2+</sup> and Ca<sup>2+</sup> cations. We found that, compared to Na<sup>+</sup> and Mg<sup>2+</sup>, Ca<sup>2+</sup> causes the bilayers to be less permeable to water.

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