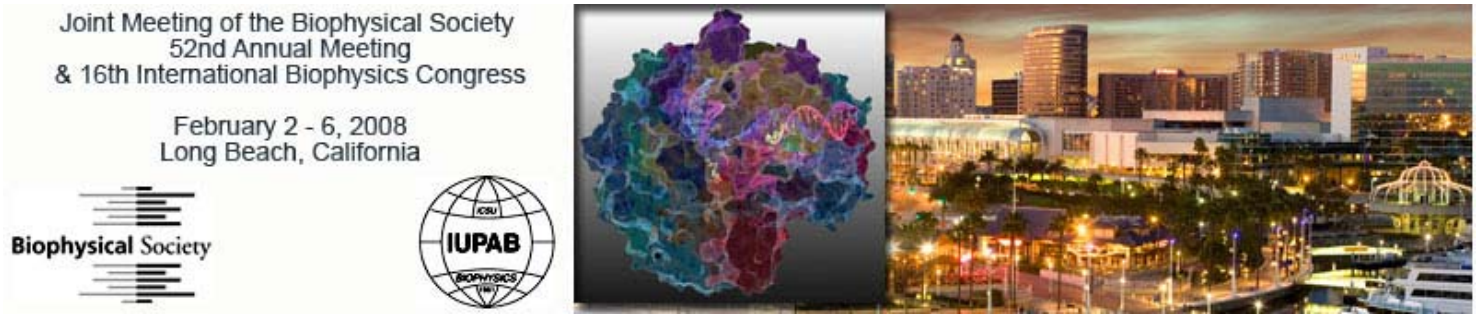

Session Title: Membrane Structure I

Presentation Number: 1161-Pos

Abstract Title: Temperature Dependence of Structure, Bending Rigidity and Bilayer Interactions of Dioleoylphosphatidylcholine Bilayers

Location: Halls A/B/C

Topic: 3E Membrane Structure

Author Block: **Jianjun Pan**[1], Stephanie Tristram-Nagle[1], Norbert Kučerka[2], John F. Nagle[1].
[1]Carnegie Mellon University, Pittsburgh, PA, USA, [2]Canadian Neutron Beam Center, NRC, Chalk River, ON, Canada.

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X-ray diffuse scattering was measured from oriented stacks and unilamellar vesicles of dioleoylphosphatidylcholine (DOPC) lipid bilayers to obtain the temperature dependence of the structure and of the material properties. The area per molecule A was 75.5Å^2 (45ºC), 72.4Å^2 (30ºC) and 69.1Å^2 (15ºC), which gives the area expansivity α_A =0.0029/deg at 30ºC, and we show that this value is in excellent agreement with the polymer brush theory. The bilayer becomes thinner with increasing temperature; the contractivity of the hydrocarbon portion was α_{Dc} = 0.0019/deg; the difference between α_A and α_{Dc} is consistent with the previously measured volume expansivity α_{Vc} = 0.0010/deg. The bending modulus K_C decreased as exp(455/T) with increasing T in Kelvins. Our area compressibility modulus K_A decreased with increasing temperature by 5%, the same as the surface tension of dodecane/water, in agreement again with the polymer brush theory. Regarding interactions between bilayers, the compression modulus B as a function of interbilayer water spacing D_W' was found to be nearly independent of temperature. The repulsive fluctuation pressure calculated from B and K_C increased with temperature and the Hamaker parameter for the van der Waals interaction was nearly independent of temperature; this explains why the fully hydrated water spacing D_W' that we obtain from our structural results increases with temperature.

Commercial Relationship: **J. Pan**, None; **S. Tristram-Nagle**, None; **N. Kučerka**, None; **J.F. Nagle**, None.

Biophysical Society
9650 Rockville Pike
Bethesda, MD 20814
Phone: 301.634.7114