

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Piezoelectricity as possible mechanism for mechano-, and magneto-receptions** ANTAL JAKLI, JOHN HARDEN, CODY NOTZ, CHRIS BAILEY, Liquid Crystal Institute, Kent State University — We have studied the piezoelectric responses of 2 dry phospholipids (L- $\alpha$ -Phosphatidylcholine) purchased from Avanti Inc. model membranes. The material was sandwiched between two parallel plates separated by  $5\mu\text{m}$ - $60\mu\text{m}$  distances and aligned with smectic layers mainly parallel to the substrates. The material has a SmA\* phase which is similar to the bilayers of cell membranes. Due to its symmetry it should be piezoelectric and may produce electric current normal to the shear plane when one of the substrates is moved with respect to the other one. We have experimentally verified this statement and found the generation of electric polarization up to  $300\text{nC}/\text{cm}^2$  when the shear induced a director tilt of about 5 degrees. We have also measured generation of electric current in phospholipids doped with 1% of ferrofluid of  $\text{Fe}_2\text{O}_3$  nanoparticles when 100G magnetic field was applied periodically on the material. Details of the observations and the relevance of these effects in mechano-, and magneto-receptions will be discussed.

Antal Jakli  
Liquid Crystal Institute, Kent State University

Date submitted: 02 Dec 2006

Electronic form version 1.4