

# Biaxial Nematic Liquid Crystal

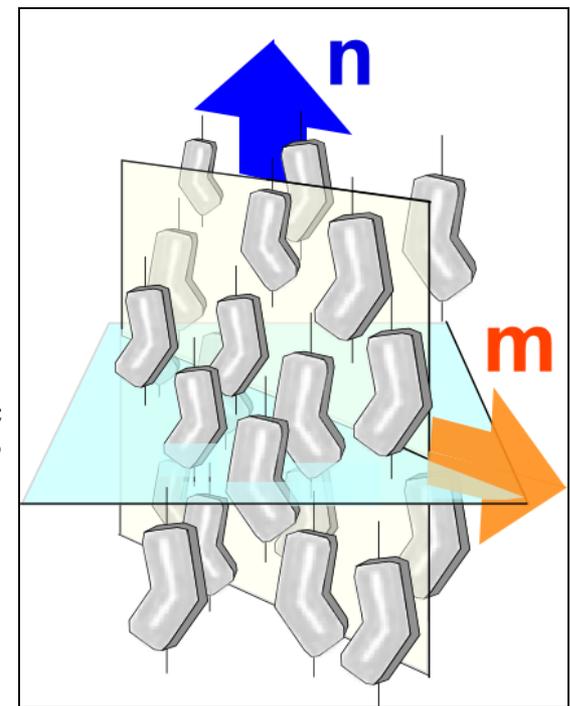
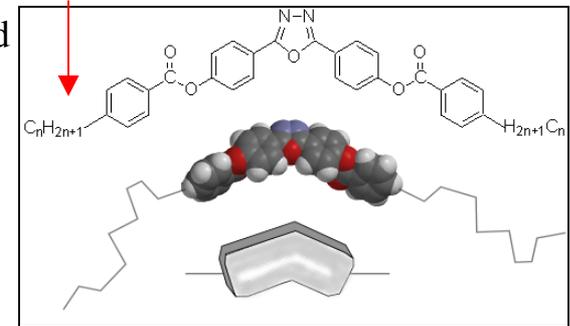
Edward T. Samulski, University of North Carolina

DMR-9971143

Some thirty-five years after IBM's Marvin Freiser predicted the possibility of a biaxial nematic ( $N_b$ ) phase — a fluid having long-range orientational order in two orthogonal directions *without* any translational order — unequivocal NMR evidence for its existence has been reported for boomerang-shaped “ODBP” molecules. But a biaxial shape may not be the whole story: Electrostatic interactions stemming from the large transverse dipole moment ( $\sim 4$  Debye) in ODBP may reinforce shape enabling for the first time a  $N_b$  phase. Room temperature materials could revolutionize switching speeds in LCDs.

*Phys. Rev. Lett.* **92**, 145505 (2004).

Boomerang-shaped “ODBP” liquid crystal molecular structure with its **dipole**, a model, and its abstracted shape.



Biaxial nematic phase of ODBP liquid crystal with primary director **n** and secondary director **m**.

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## Education:

Two undergraduates (Mike Eberle and Alex Chao), six graduate students (Theo Dingemans, Clarence Murray, Xingu Wen, Timothy Dunkin, Dana Knott and Joette Russell), and three postdocs (Chad Booth, Bin Cheng and Louis Madsen) contributed to this work. Dingemans completed a postdoc at NASA Langley and assumed a professorship at the University of Delft. Murray received his Ph.D. in 2003 and is employed by the EPA in D.C. Wen finished in 2000 and took an industrial position. Booth assumed a faculty position in 2002 at Southwest Texas University, San Marcos, Texas.

## Outreach:

The PI offered a First Year Seminar for freshman at UNC in spring 2003 titled “*You don’t have to be a rocket scientist (to critically evaluate science in the public media)*” that critiqued media descriptions of contemporary advances in science.



The PI with his 1<sup>st</sup> year Seminar class hosting Robert Park, author of “*Voodoo Science.*”