Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Sensing Structures Inspired by Blind Cave Fish MICHAEL E. MCCONNEY, Georgia Institute of Technology, NANNAN CHEN, University of Illinois at Urbana-Champagne, DAVID LU, KYLE D. ANDERSON, Georgia Institute of Technology, HUAN HU, Northwesern University, CHANG LIU, Northwestern University, VLADIMIR V. TSUKRUK, Georgia Institute of Technology — Blind cave fish, with degenerated non-functioning eyes, have evolved to "see" their hydrodynamic environment by using the flow receptors of the lateral line system. The hair-cell receptors are encapsulated in a hydrogel-like material, called a cupula, which increases the sensitivity of the hair-cell receptors by coupling their motion to the surrounding flowing media. We characterized the viscoelastic properties and of blind cave fish cupulae by using colloidal-probe spectroscopy in fluid. A photo-patternable hydrogel with similar properties was developed to mimic the fish receptor coupling structure. Flow-based measurements indicated that the hydrogels enhance drag through increased surface area, but also inherent material properties. These bio-inspired structures endowed micro-fabricated flow sensors with sensitivities rivaling that of fish.

Michael E. McConney
Georgia Institute of Technology

Date submitted: 25 Nov 2008 Electronic form version 1.4