Abstract Submitted
for the SES09 Meeting of
The American Physical Society

Nano-scale Topographical Studies on the Growth Cones of Nerve Cells using AFM GOKSEL DURKAYA, Department of Physics & Astronomy, Georgia State University, Atlanta, GA, 30303, LEI ZHONG, VINCENT REHDER, Department of Biology, Georgia State University, Atlanta, GA, 30303, NIKOLAUS DIETZ, Department of Physics & Astronomy, Georgia State University, Atlanta, GA, 30303 — Nerve cells are the fundamental units which are responsible for intercommunication within the nervous system. The neurites, fibrous cable-like extensions for information delivery, of nerve cells are tipped by highly motile sensory structures known as the growth cones which execute important functions; neural construction, decision making and navigation during development and regeneration of the nervous system. The highly dynamic subcomponents of the growth cones are important in neural activity. Atomic Force Microscopy (AFM) is the most powerful microscopy technique which is capable of imaging without conductivity constraint and in liquid media. AFM providing nano-scale topographical information on biological structures is also informative on the physical properties such as: elasticity, adhesion, and softness. This contribution focuses on AFM analysis of the growth cones of the nerve cells removed from the buccal ganglion of Helisoma trivolvis. The results of nano-scale topography and softness analysis on growth cone central domain, filopodia and overlying lamellopodium (veil) are presented. The subcomponents of the growth cones of different nerve cells are compared to each other. The results of the analysis are linked to the mechanical properties and internal molecular density distribution of the growth cones.

Goksel Durkaya
Dept of Physics & Astronomy, Georgia State University,
Atlanta, GA, 30303

Date submitted: 17 Aug 2009 Electronic form version 1.4