

## **MDPH480/PHYS480/ASTR480/MAPH480 Research Projects 2009**

Project Title: Investigation of bismuth thin films on graphite.

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### **Abstract of the Proposed Research** (use this page only)

It is believed that in near future it will be possible to eliminate environmentally unfriendly lead and substitute it with “green” bismuth in many products. This forthcoming revolution will influence many branches of industrial production starting from paints through toys and finishing with gasoline and cars. Recently, it has been also found that bismuth can spontaneously form nanostructures which could find their application in modern electronic devices.

The best methods of investigation of small objects at a scale reaching single atoms are scanning tunnelling microscopy (STM) and atomic force microscopy (AFM). Both microscopes belong to a group of devices which allow not only to observe single atoms or small clusters but also to manipulate them.

The proposed research focussed on the investigation of self assembly mechanisms of bismuth nanostructures on highly oriented pyrolytic graphite (HOPG). Topographical structure and electronic properties of vacuum grown films will be investigated using STM and AFM. Skills in ultra high vacuum technology, thin film growth, STM and AFM operation (as well as data analysis and academic writing) will be gained.