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# Colloquium Announcement

## DEPARTMENT OF PHYSICS AWARDS DAY

### Exploring the High-Pressure, High-Temperature Behavior of Materials

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While the high-pressure, high-temperature behavior of materials in applications such as material synthesis or energy production are of great interest, physical phenomena such as phase transitions and the kinetics thereof frequently pique our curiosity by exhibiting diverse or unexpected behavior. For example, while pressure-induced crystallographic phase transitions are relatively common, the mechanisms driving such transitions can vary from differences in shear stresses to complex changes in electronic band structure. Previously, dynamic high pressure experiments were often limited to a particular region of phase space such as the shock Hugoniot, resulting in a severely limited understanding of dynamic compression. As a result, a more complete understanding of materials at extreme conditions requires novel techniques for accessing new regions of thermodynamic space as well as diagnostics capable of measuring the desired material properties. To solve these problems, we developed a new high pressure technique based on the functionally-graded density (FGD) impactor. Using the FGD impactor, we can tailor stress waves in a manner that allows us to achieve previously inaccessible thermodynamic states during dynamic compression experiments. In combination with diagnostics such as velocimetry and ellipsometry, we have examined equations of state, phase transition boundaries and kinetics, and strength of materials such as Al, Ta, and H<sub>2</sub>O. This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

***Sponsored by UAB Department of Physics***

Thursday, April 19, 2007

12:30 p.m. – 1:50 p.m.

Campbell Hall Room # 274

1300 University Boulevard

For further information, please contact the  
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