ADVANCED INSTRUMENTATION SEMINARS

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Recent developments in low temperature very high pressure diamond anvil cell resistivity measurement

GUEST SPEAKER –
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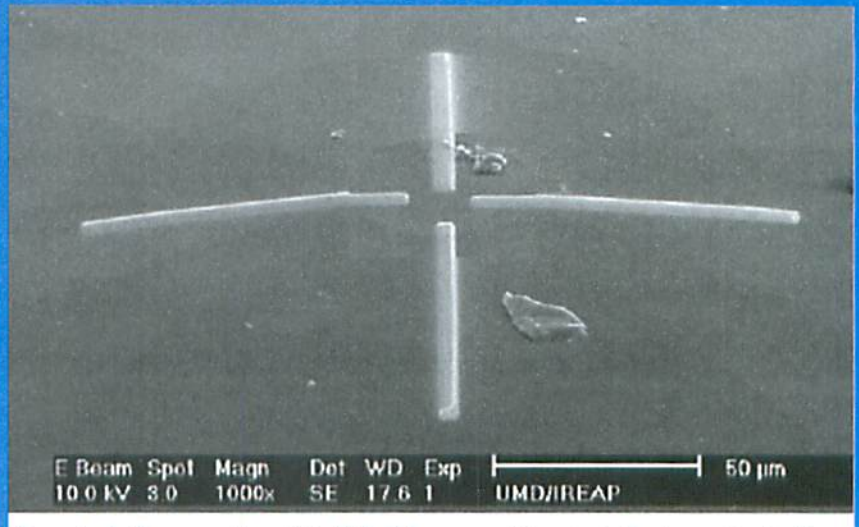

Beveled diamonds with FIB lithographic electrical contacts for multimegabar DAC resistivity measurements.

High pressure research spans area of science from biology, planetary research and geology to materials sciences and physics. Static (very) high pressures are usually achieved using the diamond anvil cell (DAC) technique. High pressure can drive matter in new structures and ground states through phase transitions, and perhaps the most eloquent example of this is the 26 elements that become superconducting under pressure. Nowadays many physical property measurements can be carried at high pressure using DAC. We will briefly review the most used DAC physical property measurement methods in condensed matter physics, from magnetic, thermodynamic, transport, optical Raman, to X-ray and neutron. DAC high pressure resistivity presents particular importance for condensed matter physics research. It is a great tool for the investigation of superconductors or materials that become superconducting with the application of pressure. Also the measurement of electrical resistivity as a function of temperature is a direct probe that can distinguish between insulating or metallic behavior. Still, there are many challenges with DAC resistivity measurements, from connecting the electrical leads to what is typically a very small sample to shear stress that can develop at high pressures and often breaks the metal leads.

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