temperature conductivities of 0,05-2 S/cm and field effect mobilities of 2-200cm2/Vs. Temperature dependent electrical measurements and Raman spectroscopic investigations reveal that charge transport occurs via variable range hopping between intact graphene islands with sizes of the order of several nanometers. The electrical properties of sheets composed of two and more layers will be also discussed (3).

1. K. S. Novoselov et al., Science 306, 666 (2004).
2. C. Berger et al., Science 312, 1191 (2006).
3. C.Gómez-Navarro et al. Nanoletters (2007)

MM 4.5 Mon 11:15 H 0107

Observation of coherent electron motion in disordered granular metals — •Michael Huth, Dirk Klingenberger, and Christina Grimm — Physikalisches Institut, Goethe-Universität, D-60438 Frankfurt am Main, Germany

We observed a $\sigma \propto \sqrt{T}$-dependence of the electrical conductivity σ vs. temperature T in metal-insulator nanocomposite samples prepared by electron beam induced deposition. This dependence was recently predicted as a low-energy contribution in the metallic regime of 3D granular metals if electron-electron interactions are taken into account[1]. It is the consequence of the occurence of a large-scale coherent electron motion and signifies a universal resistive behavior in granular metals even in the presence of disorder.

[1]I. S. Beloborodov, K. B. Efetov, A. V. Lopatin, and V. M. Vinokur, Phys. Rev. Lett. **91**, 246801 (2003); I. S. Beloborodov, A. V. Lopatin, V. M. Vinokur, and K. B. Efetov, Rev. Mod. Phys. **79**, 469 (2007)

MM 5: Nanostructured Materials II

Time: Monday 12:00–13:00 Location: H 0107

MM 5.1 Mon 12:00 H 0107

Laser-induced nanotube-nanotube interactions — •Jessica Walkenhorst[1], Martin E. Garcia[1], and Harald O. Jeschke[2] — [1]Theoretische Physik, Fachbereich Naturwissenschaften, Universität Kassel, Heinrich-Plett-Str. 40, 34132 Kassel — [2]Institut für theoretische Physik, Universität Frankfurt, Robert-Mayer-Str. 8-10, 60054 Frankfurt, Germany

We have investigated the possibility of achieving welding of two single wall nanotubes by making use of topological defects and femtosecond laser excitation. Based on molecular dynamics simulations performed on time-dependent potential energy surfaces, and considering explicitly the shape, energy and duration of the laser pulse, we describe the ultrafast dynamics of two defective nanotubes in contact to each other immediately after femtosecond excitation. We discuss the role of different defects and their respective behaviour under laser heating.

MM 5.2 Mon 12:15 H 0107

Breaking transition of carbon nanotubes and graphene under stress — •Juergen Dietel and Hagen Kleinert — Institut fuer Theoretische Physik, Freie Universitaet Berlin

We calculate the breaking transition of carbon nanotubes and graphene under homogeneous external stress as a function of temperature.

MM 5.3 Mon 12:30 H 0107

Modeling of Surface Modification and Nanostructuring on Metals due to a Femtosecond Laser Pulse — •Dmitriy Ivanov[1], Baerbel Rethfeld[1], Gerard O'Connor[2], Thomas Glynn[2], Zhibin Lin[3], and Leonid Zhigilei[3] — [1]Physics Department, Technical University of Kaiserslautern, Kaiserslautern, Germany — [2]National Centre for Laser Applications, National University of Ireland Galway, Galway, Ireland — [3]Materials Science Department, Univeristy of Virginia, Charlottesville, USA

The atomistic-continuum approach to study nanostructuring processes on metals due to fast laser energy deposition is presented. The intense, short-pulsed laser interactions are involving mechanical, thermal, and phase perturbations. Many of those non-equilibrium processes are impossible to study experimentally and difficult to model at all levels: ab-initio, atomistic, and continuum. We address this challenge combining the advantages of different approaches. Namely, the kinetics of fast non equilibrium phase transformations is treated at atomic level; and free carrier dynamics (fast electron heat conduction and laser-induced electron-phonon nonequilibrium)is accounted for in continuum part.

The combined model was applied to study the formation of nanojets on thin Ni films in femtosecond laser pulse experiments. The calculations show that surface nanostructuring is due to the interplay of three processes: establishment of temperature gradient in radial directions causes the elasto-plastic deformations; relaxation of laser-induced pressure leads to the ejection of melted material; fast electron heat conduction in 3D effectively cools down and freezes the ejected matter.

MM 5.4 Mon 12:45 H 0107

Molecular Dynamics Simulations of Nanoglasses — •Daniel Sopu[1], Karsten Albe[1], and Herberg Gleiter[2] — [1]Institut f. Materialwissenschaft, TU Darmstadt, Petersenstr. 23, D-64287 Darmstadt — [2]Inst. f. Nanotechnologie, FZ Karlsruhe, D-76021 Karlsruhe

We present molecular dynamics simulations on the structure and stability of nanoglasses that can be generated by consolidating nanometer-sized glassy spheres at high pressures (several GPa). Our results suggest that nanoglasses consist in the as prepared state of glassy regions resulting from the consolidated spheres and interfaces between these glassy regions. In these glass/glass interfaces, the free volume is enhanced and the nearest neighbor co-ordinations deviate from the ones in the glassy regions. If these nanoglasses are annealed, the enhanced free volume in the glass/glass interfaces delocalize and, thus, modifies the atomic structure of the entire material. In conclusion, nanoglasses may pave the way to tune the free volume (density) of glasses at constant chemical composition.

MM 6: Diffusion I

Time: Monday 10:15–11:30 Location: H 0111

MM 6.1 Mon 10:15 H 0111

Fast ionic mobility in cryolite studied by quasielastic neutron scattering — •Sandro Jahn[1], Jacques Ollivier[2], and Franz Demmel[3] — [1]GeoForschungsZentrum Potsdam, Telegrafenberg, 14473 Potsdam — [2]Institut Laue-Langevin, BP 156, 38042 Grenoble Cedex 9, France — [3]ISIS Facility, Chilton, OX11 0QX, UK

The relation between ionic mobility and conductivity at high temperature of the perovskite fluoride cryolite, Na_3AlF_6, is studied by quasielastic neutron scattering (QENS). Up to $T = 880$ °C the conductivity is dominated by jump diffusion of Na ions. At higher temperatures, a considerable broadening of the QENS spectra and the development of a liquid-like diffraction peak is observed. In the temperature range between $T = 880$ °C and the melting point ($T_m = 1013$ °C), the presence of about one percent of partial melt, that is expected from the phase diagram, causes a high mobility of almost all F ions of the system. The Q-dependence of the line width suggests a set-in of translational diffusion of fluorines at this temperature. This additional degree of translational movements could reason the jump-like increase in the ionic conductivity observed macroscopically.

MM 6.2 Mon 10:30 H 0111

Atomistic simulation of grazing incidence diffuse x-ray scattering from point defects — •Ruslan Kurta, Vladimir Bugaev, Melissa Delheusy, Andreas Stierle, and Helmut Dosch — Max-Planck-Institut für Metallforschung, Heisenbergstr.3, D-70569 Stuttgart, Germany

The investigation of defects in the vicinity of surfaces and interfaces is a current challenge, because such defects control important phe-