Instytut Fizyki Molekularnej PAN

oraz

Oddział Poznański

Polskiego Towarzystwa Fizycznego

zapraszają na wykład pt.:

Smart materials

który wygłosi

Professor Janez Dolinšek

J. Stefan Institute, University of Ljubljana, Jamova 39, Ljubljana, Slovenia

Wykład odbędzie się w auli Instytutu Fizyki Molekularnej
Polskiej Akademii Nauk (ul. Smoluchowskiego 17)

w dniu 13 lipca 2011 r. (środa) o godz. 13:00.

The term "smart materials" refers to complex metallic alloys and quasicrystals. Complex metallic alloys (CMAs) denote exceptional intermetallic phases with giant unit cells that contain some hundreds up to several thousand atoms. Examples are cubic $NaCd_2$ with 1152 atoms/unit cell, cubic β-Al_3Mg_2 (1168 atoms/u.c.), and the heavy-fermion compound $YbCu_{4.5}$, comprising as many as 7448 atoms in the supercell. CMAs are periodic crystals on the scale of many nanometers, whereas on the atomic scale, they resemble quasicrystals (QCs) that are characterized by crystallographically forbidden symmetries such as 5-, 8-, 10- and 12-fold rotation axes. Quasicrystals exhibit a new type of perfect structural long-range order without translational periodicity. QCs and CMAs show interesting physical properties, like "smart" combinations of metallic electrical resistivity with insulating thermal conductivity and the combination of hardness, elasticity and low friction coefficient. The sign of the thermoelectric power and the Hall coefficient can change from positive hole-like to negative electron-like with crystallographic direction. CMAs and QCs can absorb large quantities of hydrogen, making them suitable materials for the hydrogen storage. A magnetic memory effect was observed in some CMAs and QCs, which has lead to a novel concept of a memory element, a thermal memory cell, where a byte of digital information can be stored into the storage material by pure thermal manipulation, in the absence of electric or magnetic field.