s11.m33.p7 **Structural and Vibrational Properties of SiC under Very High Pressure.** E.V. Yakovenko[1], J.C. Chervin[2], M. Gauthier[2], J.P. Itié[2], A. Polian[2] and M. Mezouar[3], [1]*Institute of High Pressure Physics, Troitsk, Moscow region, 142092 Russia,* [2]*-Physique des Milieux Condensés, CNRS-UMR 7602, Université Pierre et Marie Curie, F-75252 Paris CEDEX 05,* [3]*-ESRF, B.P. 220, F-38000 Grenoble*, *France. E-mail: apo@pmc.jussieu.fr*

Keywords: Very hard materials; High pressure; Spectroscopy

Silicon carbide is a very hard compound with an extremely rich polytypism: there are at least 170 different crystals, with one (3C), 2 (2H) ... SiC "molecules" in the unit cell. We studied the most abundant, 15R SiC single crystals under very high pressure by Raman scattering and angular dispersive X-ray diffraction, in the 100 GPa range. The ambient temperature equation of state was obtained up to around 105 GPa, pressure at which a NaCl like structure appears [1].

Raman scattering studies show the disappearence of the vibrational modes around 70 GPa. When the pressure is released from approximately 100 GPa, a completely new Raman spectrum is observed, where the width of the lines shows a well crystallized phase. Moreover, the Raman scattering experiment shows that the effective charge increases with pressure, in contradiction with the behaviour observed in most of the semiconductors.

The ambient temperature phase diagram is discussed in the light of the vibrational and structural results.

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s11.m33.p8 **Temperature Dependence of Microstructure of Quenched and Aged Al - Zn Alloys.** Stanko Popovic and Zeljko Skoko, *Physics Department, Faculty of Science, University of Zagreb, 10002 Zagreb, POB. 331, Croatia; E-mail: spopovic@phy.hr*

Keywords: Metal alloys; Microstructure; Phase transitions

Al-Zn alloys are two-phase systems in the equilibrium state: α(Al-rich fcc, the matrix, M) and β(Zn-rich, hcp, precipitates). The precipitation and dissolution phenomena and associated phase transitions in a series of alloys up to 62 at% Zn, subjected to various thermal treatments, were studied *in situ* by XRD [1,2]. Recently, the thermal behaviour of microstructure of the alloys with 44 and 48 at% Zn, was studied in detail. Each alloy was subjected to two thermal treatments: (*i*) rapid quenching from the solid-solution temperature, T_{SS}, in water at RT (quenching rate $>10^4$ K/s) and ageing at RT for a week (samples WQ); (*ii*) cooling slowly from T_{SS} to RT over 5 days and ageing at RT for a week (samples SC). The samples SC were closer to the equilibrium state than the samples WQ; the latter having residual strains, quenched-in vacancies and a non-uniform distribution of β(Zn) precipitates. The solid solution, α_{SS}, was formed above 700 K for SC and above 800 K for WQ. The rapidly quenched alloys were also aged for 11 months at RT. All the alloys were slowly heated to TSS and slowly cooled to RT, and their microstructure was followed by XRD. As the temperature increased, a decrease of diffraction line intensities took place, due to increased thermal vibrations of atoms. A gradual shift of diffraction lines was noticed due to thermal expansion. The phase β(Zn) showed an anisotropy in thermal expansion and a change in the precipitate shape. A partial dissolution of β(Zn) in α(M/β) took place above 500 K, and a partial transition of β(Zn) and α(M/b) into α'(fcc, rich in Zn) took place above 550 K. The three phases coexisted up to T_{SS}. In the cooling run the alloys exhibited a temperature hysteresis in relation to the heating run. The microstructure of the samples, aged for 11 months after quenching, was much closer to the equilibrium state than the one of the samples aged for 1 week after quenching. The ideal equilibrium state was not reached in either treatment. A similar behaviour was observed for alloys having 54 and 62 at%Zn [3, 4]. Instead of transitions according to the phase diagram, $\alpha(M/\beta) + \beta - \alpha' + \alpha(M/\alpha') - \alpha_{SS}$, this sequence was found: $\alpha(M/b) + \beta - \alpha' + \beta + \alpha(M/\alpha',b) - \alpha_{SS}$.

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