05.1-1 THE INITIAL INTERACTION OF OXYGEN WITH THE NICKEL(110) SURFACE - A SCANNING TUNNELING MICROSCOPY (STM) INVESTIGATION. By K. J. Pittner, J. Winterlin, R. J. Behm, Institut für Kristallographie, Universität München, FRG, *Fritz Haber-Institut der MPG, Berlin.

STM topographic images scanned during adsorption show both the evolution of the 2x1/3x1 chemisorbed structures and the formation of ordered (9x4) and disordered surface oxides. Either reaction involves the rearrangement and transport of substrate atoms. The dependence of material transport within the first surface layer on temperature and on the concentration of defects is demonstrated. At T > 400 K, the evolution of the 2x1 phase proceeds via the formation and growth of reconstructed and partially disordered areas. Their average size is approximately given by the mean distance between surface inhomogeneities. With a very low defect concentration, terraces of about 1000 Å width are found to be stable even within the chemisorption stage. Beyond a critical coverage, however, considerable parts of the first layer atoms start to diffuse over large (100 to 1000 Å) distances and a surface is obtained that consists of steps and terraces. The 3x1 and the 9x4 phases have been imaged with atomic resolution.

05.1-2 OPTICAL ACTIVITY OF THE INCOMMENSURATE PHASE OF Rb₂SnCl₄. By K. Saito and J. Appl. Cryst., 1986, 19, 377-381. The improved method has been successfully applied to the measurement of the temperature dependences of the optical activity of [N(CH₃)₄]₂SnCl₄ (K. Kobayashi and K. Saito, Proc. Japan Acad., 1986, 62B, 177-179) [N(CH₃)₄]₂ZnCl₂ and (NH₄)₂BeF₄. It has been found that the display optical activity in their incommensurate phases. Here, we report the result of measurement of optical activity in the incommensurate phase of Rb₂SnCl₄, where the light beam travels along a direction rotated by π/4 from the b and c axes. Fig. 1 and Fig. 2 represent the temperature dependences of birefringence and a gyration tensor component g₃₃, respectively. g₃₃ linearly increases with decreasing temperature from T₂ in the higher temperature region of the incommensurate phase. The value of g₃₃ at ~7°C is compared with the peak values of the incommensurate phases of the above-mentioned crystals in Table 1.


While the existence of several high-pressure phases has been reported for the Group Vb elements, F, Sb, and Bi, an indication of pressure-induced structural transitions, based on in-situ measurements, has not hitherto been found for Au. Extending considerably the pressure range attainable, we have carried out X-ray and synchrotron radiation diffraction study on this element and found a new phase transition.

Diamond-anvil cell was used with paraffin oil as pressure transmitting medium and ruby tips as pressure sensor. The sample temperature was kept not only at room temperature but also at 200°C or higher. The heating could reveal the occurrence of structural changes which might have been suppressed owing to insufficient atom mobility at the lower temperature. The Au-type structure characteristic of the Group Vb elements, however, remains stable up to a pressure as high as 30 GPa with the rhombohedral distortion of the lattice decreasing continuously. At 32 GPa, a change in the diffraction pattern was observed and the variations were indexed in terms of the primitive simple cubic structure, which is stable upon further compression up to at least 41 GPa. The volume discontinuity at the transition is very small as observed for F.