Poster Presentation

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Phase transitions toward charge density wave in the m=11.5 Mono phosphate bronze

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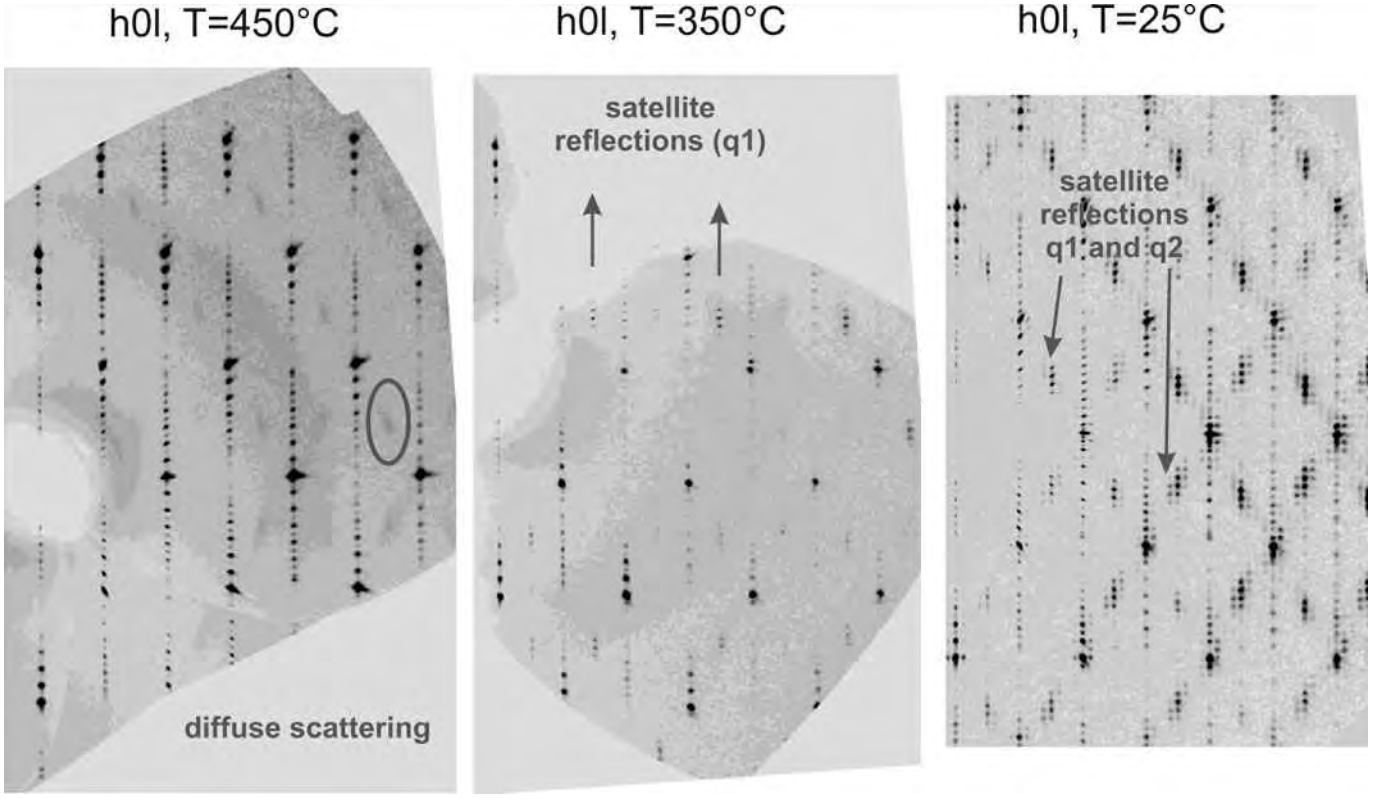
Mono Phosphate Tungsten Bronzes (MPTB), (PO2)4(WO3)2m (m ranging from 4 to 14), are a large family of conductors of low dimensionality[1]. Their structure may be described as a regular stacking of WO3-type slabs with a thickness function of m, joined by slices of tetrahedral PO4 phosphate. Successive Peierls transitions towards charge-density wave (CDW) or spin-density wave (SDW) states are observed below different critical temperatures (TC1, TC2 …). Structural transitions toward incommensurate modulated phases are associated with these complex electronic states. Recently an original member of MPTB, the member m=11.5 with formula (PO2)4(WO3)11(WO3)12, resulting in a regular intergrowth between m=11 and m=12 member, has been synthetized. An accurate investigation of the reciprocal space versus the temperature using single crystal X-ray diffraction shows the existence of two phase transitions at Tc1=430°C and Tc2=280°C. The ground state structure may be described with the following cell parameters a=5.3431(7) b=6.5901(9) c=40.884(6) α=93.096(2) β=93.734(2) γ=90.000(2) and the SG P-1. Both transitions associated with the occurrence of CDW are characterized by the appearance of modulation vectors (q1 and q2 associated to Tc1 and Tc2 respectively) and an increasing of the dimension of the superspace group (see figure 1). A structural study of the m=11.5 member is performed above Tc1 and below Tc1 and Tc2; an interpretation of the CDW state is then proposed. The evolution of the intensity of the satellite and main reflections around Tc1 and Tc2 is analyzed for characterizing the order parameter of the transitions. Finally, resistivity and magnetoresitance measurements of a large single crystal sample of m=11.5 MPTB are performed in a temperature interval from 2K to 300K. These measures are revealing at ~50K a possible SDW transition due to electron-electron interactions playing significant role in that material[2]. Further neutron diffraction experiment at very low temperature shall be performed to clarify this point.

[1] *P. Roussel, O. Pérez, Ph. Labbé, Acta Cryst B57 (2000) 603,* ***[2]*** *M. Greenblatt, Acc. Chem. Res. 29 (1996) 219*



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