

In order to *in situ* observe the formation of ternary compounds Mg-B-C under high pressures and high temperatures, the mixture of Mg, glassy carbon and amorphous boron has been compressed to 9 GPa and probed by X-ray diffraction (XRD) during heating. The sequence of XRD patterns has been obtained at ID06 beamline of ESRF using newly installed large-volume press allowing to probe the large enough amount (1-3 mm³) of light-element samples to obtain a good quality powder diffraction patterns under pressures. Pressure and temperature have been estimated using the *p-V-T* equations of state of Mg and MgO.

The onset of formation of new phases was observed at ~1500 K, similar to the case of Mg-C mixture alone. However, the final product of crystallization was completely different. Figure shows a diffraction pattern of thus grown single crystal of a new ternary compound. The preliminary analysis of spot positions allowed us to establish the hexagonal symmetry, lattice parameters ($a = 6.456$ Å, $c = 5.229$ Å) and the most probable space groups ($P6_3/mmc$, $P6_3/mcm$, and $P6_3mc$). Possible isostructural compounds are Ni₃S₄, FeS(2H), Mn₅Si₃, and ZnCl₃. Preliminary magnetic measurements show the ferromagnetic properties with $T_{\text{Curie}} > 300$ K (Inset of the Figure). Further studies of new compound are on the way.

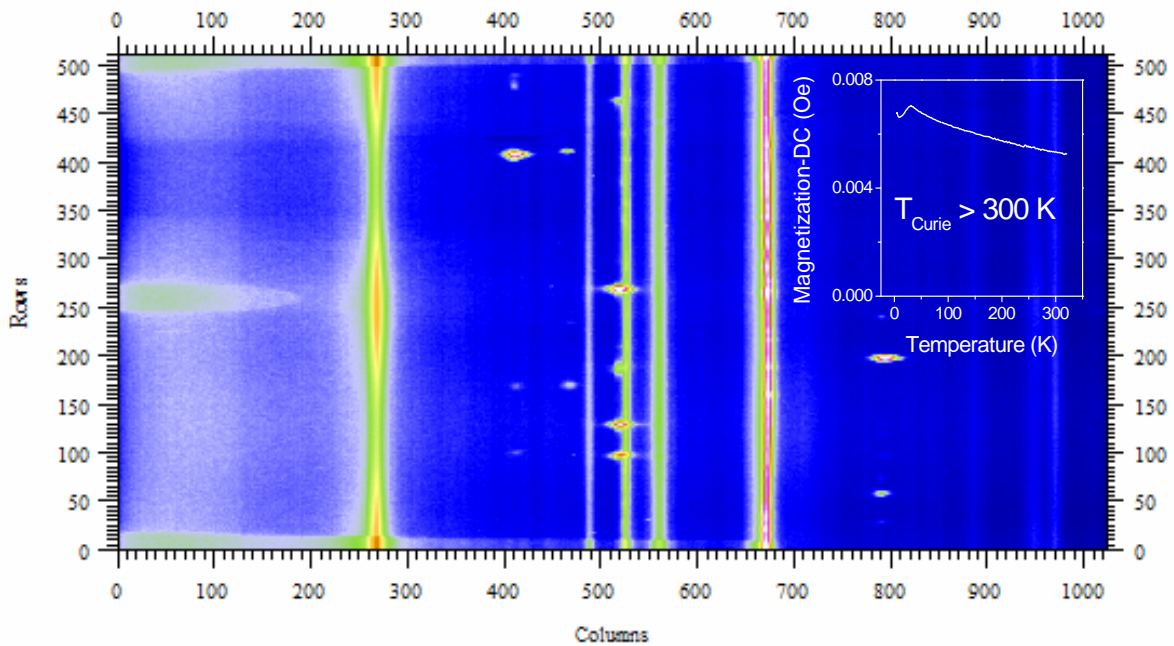


Figure. Single crystal spots of a new phase grown in the Mg-B-C system. Continuous lines correspond to magnesium, graphite (heater) and magnesium oxide (capsule).