

## SPD-induced crystallization in two Fe-based metallic glasses

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After applying severe plastic deformation (SPD) via high pressure torsion (HPT) on the two iron-based metallic glasses (1)  $\text{Fe}_{73.9}\text{Cu}_1\text{Nb}_3\text{Si}_{15.5}\text{B}_{6.6}$  and (2)  $\text{Fe}_{81.2}\text{Co}_4\text{Si}_{0.5}\text{B}_{9.5}\text{P}_4\text{Cu}_{0.8}$ , the microstructural features are investigated and compared. HPT allowed to consolidate and plastically deform alloy (1) to deformation strains which were much larger than those reported in [1] while exhibiting a still amorphous structure, and alloy (2) for the first time at all, which, however, showed partial crystallization. Methods of X-ray diffraction, differential mechanical and differential scanning analyses, as well as optical and scanning electron microscopy were carried out to characterize the phenomena of HPT-induced crystallization and check for crack formation. Selected analyses by transmission electron microscopy were done to further confirm the deformation induced formation of nanocrystals (Fig.1).

**Keywords:** iron based metallic glasses; high pressure torsion; crystallization

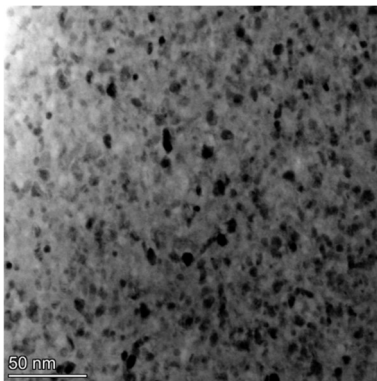


Fig. 1:

TEM image (bright field) of the microstructure in  $\text{Fe}_{81.2}\text{Co}_4\text{Si}_{0.5}\text{B}_{9.5}\text{P}_4\text{Cu}_{0.8}$  after HPT-deformation for 10 rotations at room temperature

- [1] M. Antoni, F. Spieckermann, V. Soprunyuk, N. Chawake, B. Sarac, J. Zalesak, Ch. Polak, Ch. Gammer, R. Pippan, M. Zehetbauer, J. Eckert, J.Mag.Magn.Mater. 525 (2021) 167679- 5