Microstructure and crystallization in $\text{Cu}_{50}\text{Zr}_{45}\text{Al}_5$
metallic glass


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Microstructure and crystallization of a $\text{Cu}_{50}\text{Zr}_{45}\text{Al}_5$ metallic glass have been investigated by differential scanning calorimetry, x-ray diffraction and extended x-ray absorption fine structure (EXAFS) using synchrotron radiation. The width of the supercooled region is $\Delta T_x = T_x - T_g = 67$ K, where $T_x$ and $T_g$ are the crystallization and the glass transition temperature, respectively; the reduced glass transition temperature is $T_{rg} = T_g / T_l = 0.65$, where $T_l$ is the liquid temperature; and $\gamma = T_x / (T_g + T_l) = 0.41$. After crystallization of the as-prepared $\text{Cu}_{50}\text{Zr}_{45}\text{Al}_5$ metallic glass, crystalline phases are identified as tetragonal $\text{CuZr}_2$ and orthorhombic $\text{Cu}_{10}\text{Zr}_7$. The local atomic structures deduced from EXAFS reveal that Zr atoms in the as-prepared $\text{Cu}_{50}\text{Zr}_{45}\text{Al}_5$ metallic glass are surrounded by about 5 Cu atoms at a distance of 2.70 Å and about 5 Zr atoms at 3.14 Å. The work has been carried out at BW5 and F2.1 for XRD and A1,E4, and X1 for XAFS measurements.

References