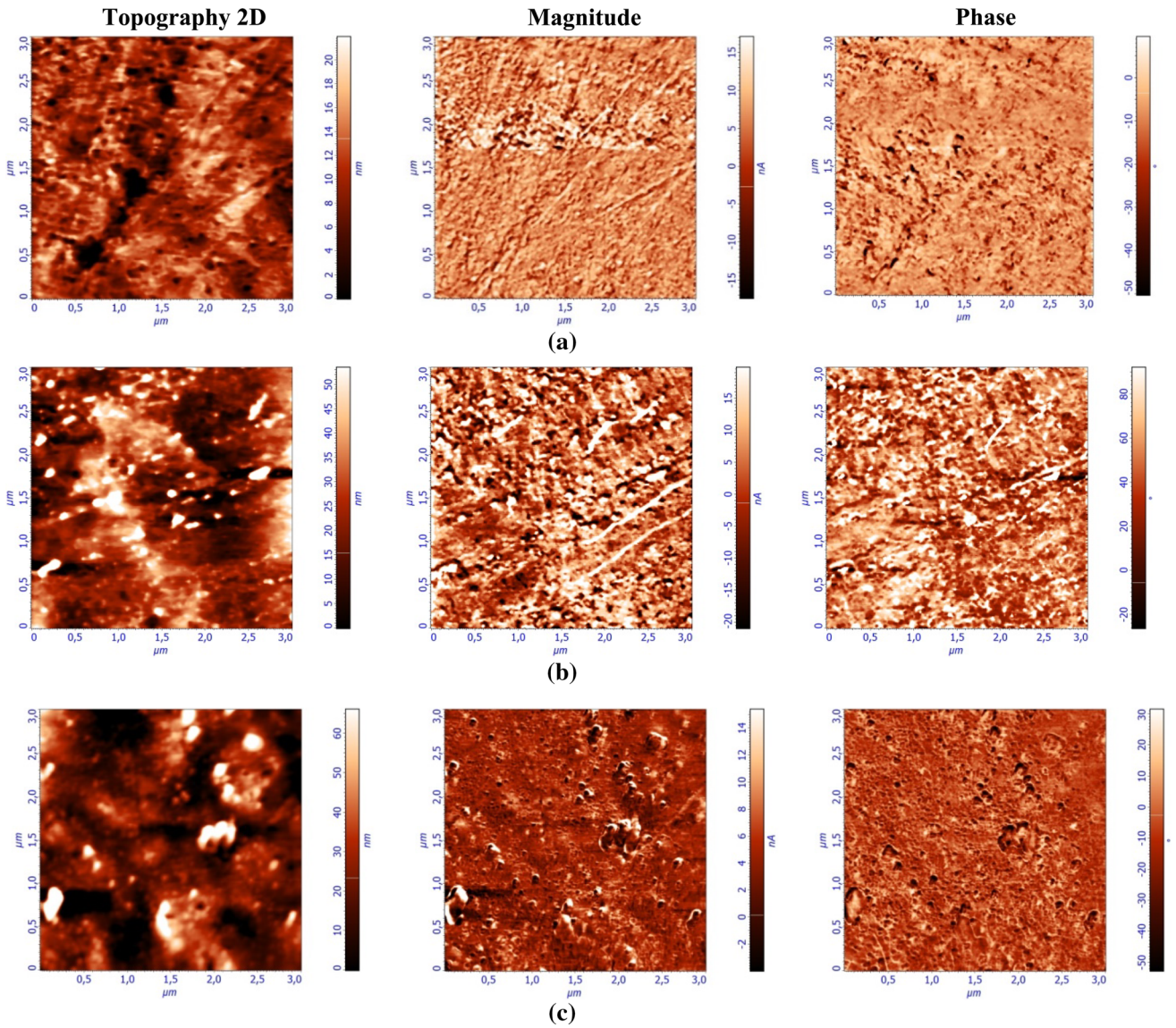

Figure 11 PFM images showing the surface topography 2D, the magnitude and the phase of the piezoresponse of $(1 - x)$PVDF–$(x)Ba_{12}Fe_{28}Ti_{15}O_{84}$ composites with: $x = 0$ vol% (**a**); $x = 4$ vol% (**b**) and $x = 9$ vol% (**c**).

impossible to detect the phase transformation around the filler particles, if present.

The ME effect in PVDF–ferrite composite is extrinsic in nature and depends on the composite microstructure, external magnetic field strength and coupling interaction across the magnetic and ferroelectric interfaces. As the external magnetic field is removed, after a certain time (a half hour), both surface topography and piezoelectric response of PVDF–BFT composite significantly change (Fig. 12b). The alignment of the magnetic particles vanishes, while domain structures with different orientations of polarization are again randomly distributed on the composite's surfaces.

The magnetic force microscopy (MFM) technique was further used in order to check the magnetic properties by imaging the magnetic domains of the PVDF–BFT composite samples. MFM images (Fig. 13), acquired in the absence of external magnetic field, for the sample with 4 vol% BFT concentration, show active magnetic regions (bright response) that represent the collective response of the magnetic ordered particles. The magnitude (magnetic response) and phase images do not match at all with to the topography image. This denotes the