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Imprinted emergent textures in amorphous rare-earth transition-metal ferrimagnets

Content

Amorphous rare-earth transition-metal (RE-TM) ferrimagnets are workhorse materials in the field of spintronics. Developed chiefly for magneto-optical recording and bubble memories in the second half of the 20th century, they have remained at the forefront of the field, for example because they allow for ultrafast all-optical switching¹, ultrafast current-driven domain wall motion², and easy, gradual tuning from ferromagnetic to antiferromagnetic behavior. However, these materials are also known to exhibit chemical heterogeneity, both laterally³ and in thickness direction⁴, as well as sperimagnetism⁵, i.e., intrinsically non-collinear alignment of spins. So far, these effects were largely ignored in spintronics research.

Here, we report on the discovery of emergent textures in the structure of amorphous RE-TM ferrimagnets (Fig. 1), which are imprints the magnetic domains walls of the as-grown state and can be traced back to long-range-ordered patterns of chemical heterogeneity and sperimagnetism. The nature and implications of these imprinted emergent textures are revealed by resonant x-ray scattering and imaging experiments, in concert with advanced transmission electron microscopy and scanning probe microscopy, as discussed in this talk.

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