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

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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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