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Photocontrol of Magnetism above 77 K in Nanoscaled Heterostructures of Cyanometallate Coordination Networks: Mechanism and Limits[1]

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Using nanometer-sized heterostructures of cyanometallate coordination networks, specifically core@shell nanoparticles of CoFe@CrCr-PBA (PBA = Prussian blue analogues), irradiation by white light at 80 K modifies the magnetic response, and these changes remain intact and persist without continued irradiation to nominally 125 K.[2] Preliminary pressure studies indicate the photoinduced changes can be maintained up to 200 K, the transition temperature of the ferromagnetic CrCr-PBA component. The effect, which we first reported up to 70 K,[3,4] arises from thermally induced interface strain, which is relaxed by irradiation of the photactive consituent, CoFe-PBA. The ferromagnetic domains in the strained interface region are affected and generate the persistent changes of the magnetism. Our understanding of this photo-magnetostructural mechanism enabled us to extend the phenomenon to include photoactive spin-crossover systems[5] and other ferromagnetic PBAs.[6] The potential path to higher temperatures will be sketched.

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