[*C7.* A. Goujon] Neutron Laue diffraction on the spin crossover crystal [Fe(ptz)$_6$](BF$_4$)$_2$ showing continuous photo-induced transformation

Structural aspects of photoinduced phase transitions in spin-crossover compounds have been investigated by neutron Laue diffraction. A photocrystallographic experimental setup has been installed on the vertical-axis Laue diffracto-meter VIVALDI at the Institut Laue Langevin. The structures of the ground state and of the metastable LIESST (Light Induced Excited Spin State Trapping) state of the Fe^{II} spin-transition compound [Fe(ptz)$_6$](BF$_4$)$_2$] in the quenched state were determined at T = 2 K. The results show that the local structure change upon photoinduced spin transformation is essentially an expansion of the Fe-N$_6$ core without lowering of the O_h symmetry of the Fe environment. The Fe–N distance is increased by 0.21 Å and the unit-cell volume by about 2%. It was found that the local structure of the photoinduced phase is very close to that of the high-temperature high-spin state. The evolution of the (0,-2, 8) Laue spot, as a function of the total irradiation time, is shown in the figure. For the first time, a progressive character of the photoinduced phase transformation was evidenced in spin-crossover compounds. The observed continuous shift clearly rules out the nucleation and growth of like-spin domains (LSDs) in the phase transformation. It also shows the basically homogeneous character of the photoexcitation process.

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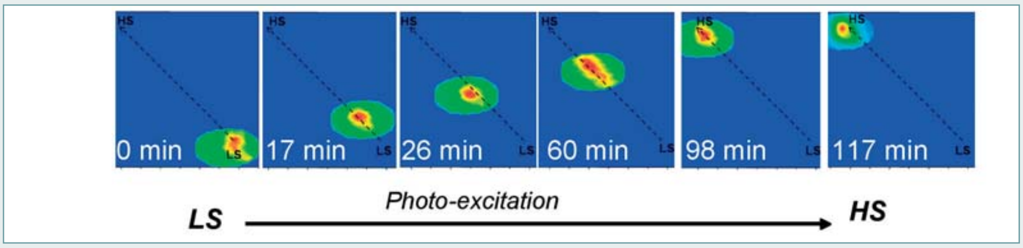

Absence of LSDs during photo-excitation of the spin-crossover crystal [Fe(ptz)$_6$]BF$_4$, rhombohedral phase (Goujon et al., Phys. Rev. B, 2006)

[*C8.* A. Tamion] Magnetization depth profile of (Fe/Dy) multilayers

The magnetization of [Fe 3nm/Dy 2nm] multilayers has been studied. The samples were thermally evaporated under ultra-high vacuum at different substrate temperatures varying from 320 K to 870 K. In order to get the magnetization depth profile of these Transition Metal/Rare Earth (TM/RE) multilayers, an investigation of the structural, chemical, and magnetic properties was carried out. The samples were studied by High Resolution Transmission Electron Microscopy (HRTEM), Three-Dimensional Atom Probe (3DAP) and Polarized Neutron Reflectivity (PNR). The multilayers have been found to be rather homogeneous, except for the first two bilayers deposited on the substrate : the mainly crystalline structure of the first Fe layers leads to an enhancement of the ordering temperature of amorphous Dy. Moreover, at low temperature, a negative exchange coupling between Fe and Dy layers has been evidenced. Magnetization profiles have also been calculated by Monte Carlo simulations to support the PNR fits.

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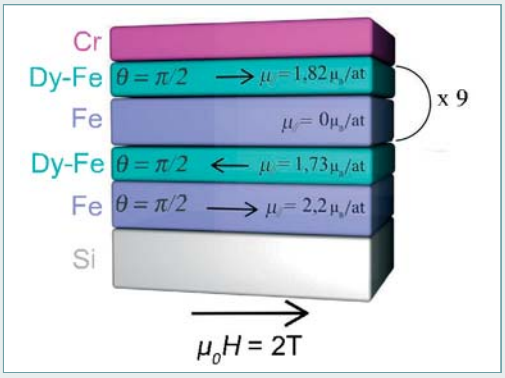

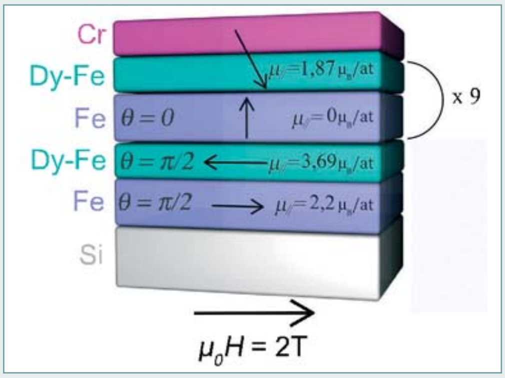

Samples deposited at a substrate temperature of 570 K. There is some interdiffusion between the Fe and the Dy layers. (left) at room temperature, no moment was found in the Fe layer because of its amorphous nature; (right) at 100 K, the Fe and Dy-Fe layers order antiferromagnetically. The layers in contact with the substrate behave very differently from the top layers.