We present here detailed investigation of the out-of-equilibrium spin-state switching dynamics of a molecular Fe(III) spin-crossover solid triggered by a femtosecond laser flash. The time-resolved x-ray diffraction and optical results [1-3] show that the dynamics span from sub-picosecond local photo-switching (Figure) followed by volume expansion on nanosecond time scale and thermal switching on microsecond) time-scale. We discuss a physical picture of the consecutive steps in the out-of-equilibrium dynamics associated with the photo-switching of such molecular materials.

Schematic drawing of the photoinduced spin-state switching, involving rearrangement of electronic and structural degrees of freedom.