Physico-Chemical nanomaterials science

Temperature and pressure influence on spin transition in Hofmann –like 3D polymer $Fe(pz)[Pt(CN)_4]$

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The progress in study of the spin transition (ST) phenomenon in molecular and molecular based compounds has been achieved last time. Now the main efforts are directed on getting possibilities of inducing and driving of the ST in these compounds with different external actions for opening the ways to use this phenomenon in saving information devices in molecular scale.

In this work we have investigated under pressure the spincrossover phenomenon (SCO) in the 3D coordination polymer $Fe(pz)[Pt(CN)_4]$ with spin transition at room temperature and with wide hysteresis. The temperature induced spin transition under pressure and pressure induced spin transition at room temperature were studied. Unusual behavior of the spin state under pressure at variation of the temperature contained in appearance of the high spin state in the region of the low spin state and influence of the cycling of the cooling and warming of the sample was observed. This behavior, supposedly, is explained with appearance of the distortions in the nearest surrounding of the iron with temperature cycling. Under pressure at room temperature the high spin - low spin phase transition takes place. The pressure induced spin transition runs without hysteresis at $P_{1/2}$. It is the first case when the temperature induced ST has a big hysteresis and pressure induced spin transition runs without hysteresis.

The interaction parameters and change of the enthalpy were calculated for both experiments and is shown the difference in interaction parameters and complete identity in enthalpy. The comparison of the studied Hoffman-like compounds under pressure shows that the nature of the difference in pressure induced and temperature induced under pressure spin transitions is not clear to the end and needs in more deep investigation.

In summary, this material presents the interesting properties, which makes it very attractive in the context of the search for new functional materials.

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