Supplementary Material (ESI) for Chemical Communications

Preparation of nanoparticle-coated microcrystals via bottom-up self-assembly

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Supplementary Information

Powder X-Ray Diffraction

X-ray powder diffraction patterns were collected using a Siemens D500 diffractometer, using CuK_α radiation, Bragg-Brentano geometry and a post-sample monochromator. The patterns revealed that both forms were of the Arcanite form of K_2SO_4. The refined unit cells are given in Table 1 and show that there is no difference between the two samples. There are no impurity phases present and there appears to be no separate crystalline phase of the nanoparticles. Using the derived unit cells, the morphology of the crystals observed under SEM can be ascertained. The large flat face can be ascribed to the (001) Miller planes. The slight side faces seemn for some crystals define the other faces to be {100}, {010} and {210} families of Miller planes

Table 1. Refined unit cell parameters of the K_2SO_4 microcrystals without and with nanoparticles coating. The form is Arcanite, which has space group Pmcn.

	K_2SO_4	K_2SO_4 + nanoparticles
a_0	0.57648(4) nm	0.57626 (8) nm
b_0	1.00444(4) nm	1.00420 (9) nm
c_0	0.74551 (3) nm	0.74522 (7) nm

DSC

As shown in Figure 2 the enthalpy obtained from the exotherm at 220 C is directly proportional to nanoparticle loading above monolayer coverage.

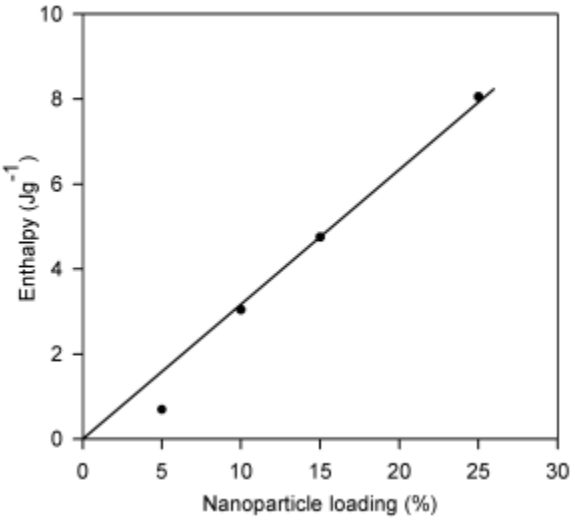

Fig. 2. Plot of enthalpy associated with sintering of nanoparticles against wt % loading of nanoparticle coated K_2SO_4 microcrystals.

The DSC trace for the pure nanoparticles (Fig. 2) shows a broader exotherm at a slightly lower temperature than that observed for nanoparticles coated on the crystals.

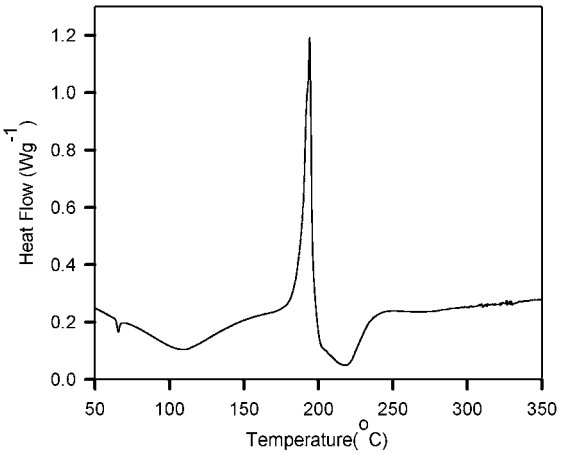

Fig.2 DSC thermogram of pure Au-Tiopronin nanoparticle in N_2 atmosphere.