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**Magnetism of Au Nanoparticles on *Sulfolobus Acidocaldarius* S-Layer** JUAN BARTOLOME, F. BARTOLOME, L.M. GARCIA, A.I. FIGUEROA, ICMA, Universidad de Zaragoza - CSIC, Spain, T. HERRMANNSSDOERFER, R. SKROTZKI, R. SCHOENEMANN, J. WOSNITZA, Dresden High Magnetic Field Laboratory, HZDR, Dresden, Germany, S. SELENSKA-POBELL, A. GEISLER, T. REITZ, Institute of Radiochemistry, HZDR, Dresden, Germany, F. WILHELM, A. ROGALEV, ESRF, Grenoble, France — Au nanoparticles (NP) with diameters of a few nm have been synthesized on a protein S-layer of *Sulfolobus Acidocaldarius* bacteria. SQUID magnetization ( $1.8 \text{ K} < T < 300 \text{ K}$  and  $0 < B < 7 \text{ T}$ ) shows superparamagnetic behavior at low-T. Its origin lays at the Au NP's, as has been proven by Au  $L_{2,3}$ -edge XMCD spectroscopy, performed in the range  $2.2 < T < 20 \text{ K}$  and up to  $B_{app}=17 \text{ T}$ . XMCD analysis yields a total magnetic moment per Au atom  $\mu_{Au} = 0.050(1) \mu_B$ , a particle average moment  $m_{part} = 2.3 \mu_B$ , Au orbital to spin moment ratio of  $m_L/m_S = 0.29$ , and Curie-like superparamagnetism. Au-S bonds are detected by S K-edge XAS measurements. Besides, EXAFS at the Au  $L_3$ -edge shows that the Au NP internal structure is fcc, and Au-S bonds are located at the particle surface. An increase of the hole charge carrier density in the Au 5d band due to electron transfer with the S-layer explains the Au magnetism. The observed magnetic moment per Au atom is 25 times larger than those previously found by XMCD in Au-thiol capped NPs.

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