Erratum: Magnetic mixed valent semimetal $EuZnSb_2$ with Dirac states in the band structure [Phys. Rev. Research 2, 033462 (2020)]

Aifeng Wang (王爱峰), Sviatoslav Baranets, Yu Liu (刘育), Xiao Tong, E. Stavitski, Jing Zhang, Yisheng Chai, Wei-Guo Yin (尹卫国), Svilen Bobev, and C. Petrovic

(Received 13 April 2021; published 26 April 2021)

DOI: 10.1103/PhysRevResearch.3.029002

We have found the following error in our published paper. In Fig. 1(g) in the original paper $\chi(T)$ was fitted with $\chi = \chi_0 + \frac{C}{T-\theta}$, where χ_0 is the temperature-independent Pauli contribution and C is related to the effective moments. The Curie constant in the fit is $C = 7.99(8)$, and $C = 8.86(6)$ (mol Eu^{-1}emu^{-1}) for the magnetic field applied on the ab plane or along the c axis. The correct Eu effective moment using $\mu_{\text{eff}} = (8C)^{1/2}$ is $7.99(8)\mu_B$ for the in-plane magnetic field and $8.41(8)\mu_B$ in the orthogonal direction. This gives a polycrystalline average value of 8.12(2), clearly close to the Eu^{2+} free-ion value of $7.94\mu_B$. Values of 3.5 and $3.7\mu_B$ for H $\parallel$ ab and for H $\parallel$ c in our paper were obtained due to a calculation error. Next, we note that assignment of x-ray photoemission spectroscopy (XPS) Eu^{2+} and Eu^{3+} peaks [Fig. 1(h) in the original paper] is correct and it matches well the observed spectra in Eu-mixed valent materials [1–4]. To investigate possible Eu_2O_3 contamination we repeated the XPS experiment using grown crystals that have never been exposed to air; all crystal surfaces were cut and cleaved in a glove box with subparts per million levels of oxygen and moisture. Samples were prepared for the XPS experiment, mounted on sample holders, and then transferred to a XPS instrument using ultra-high-vacuum (UHV) suitcase. The XPS experiment result was identical to Fig. 1(f) in the original paper. We note, however, that the peak at 1135 eV in Fig. 1(f) in our paper is close to Eu^{3+} in Eu_2O_3 [4]. Investigation of possible oxygen contamination of the sample revealed an O1s XPS peak near 532 eV [4]. Upon repeated Ar-ion bombardment in UHV we observed the reduction of the O1s peak whereas the ratio of Eu^{3+}/Eu^{2+} did not decrease with the decrease in oxygen concentration, hence, Eu^{3+} is unlikely to be associated with oxidized Eu. Combined magnetic susceptibility and the XPS result suggest a possibility for the surface valence state due to reduced atomic coordination at the surface different from the bulk as observed in the number of Sm and Eu compounds [3,5–9].

We thank S. Bud'ko, D. Ryan, D. Cheptyakov, and D. Mazzone for useful communications.

[1] Z. Haque, G. S. Thakur, R. Parthasarathy, B. Gerke, T. Block, L. Heletta, R. Pöttgen, A. G. Joshi, G. K. Selvan, S. Arumugam, L. C. Gupta, and A. K. Ganguli, Inorg. Chem. **56**, 3182 (2017).

[2] Z. Haque, G. S. Thakur, G. K. Selvan, T. Block, O. Janka, R. Pöttgen, A. G. Joshi, R. Parthasarathy, S. Arumugam, L. C. Gupta and A. K. Ganguli, Inorg. Chem. **57**, 37 (2018).

[3] E. J. Cho and S. J. Oh, Phys. Rev. B **59**, 15613(R) (1999).

[4] F. Mercier, C. Alliot, L. Bion, N. Thromat, and P. Toulhoat, J. Electron Spectrosc. Relat. Phenom. **150**, 21 (2006).

[5] C. Laubschat, B. Perscheid, and W. D. Schneider, Phys. Rev. B **28**, 4342 (1983).

[6] C. Laubschat and E. Weschke, Surf. Rev. Lett. **3**, 1773 (1996).

[7] C. Laubschat, Appl. Phys. A: Mater. Sci. Process. **65**, 573 (1997).

[8] N. Martenson, F. U. Hillbrecht, and D. D. Sarma, Surf. Sci. **152-153**, 733 (1985).

[9] Y. Ohno and T. Urata, J. Electron Spectrosc. Relat. Phenom. **125**, 171 (2002).