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Valence change of europium and its relation to superconductivity in $\text{EuFe}_2\text{As}_{1.4}\text{P}_{0.6}$ and compressed EuFe_2As_2 LILING SUN, JING GUO, GENFU CHEN, XIANHUI CHEN, XIAOLI DONG, WEI LU, CHAO ZHANG, ZHENG JIANG, YANG ZUO, SHUO ZHANG, YUYING HUANG, QI WU, XI DAI, YUANCHUN LI, JING LIU, ZHONGXIAN ZHAO — Superconductivity can be realized in Eu-containing pnictides by applying chemical (internal) and physical (external) pressure, the intrinsic physical mechanism of which attracts much attention in the studies of pnictide superconductors. Here we present the experimental evidence for the pressure-induced valence change of europium in $\text{EuFe}_2\text{As}_{1.4}\text{P}_{0.6}$ exposed to ambient pressure and EuFe_2As_2 to high pressure by x-ray absorption measurements on L_3 -Eu edge. We found that the absorption spectrum of $\text{EuFe}_2\text{As}_{1.4}\text{P}_{0.6}$ showed a clear spectra weight transfer from divalent to trivalent state. Furthermore, a similar behavior of valence transition as in $\text{EuFe}_2\text{As}_{1.4}\text{P}_{0.6}$ was also observed in EuFe_2As_2 when pressure was applied. This is the first to report the observation of valence change in pnictide superconductors and the analysis of its influence on superconductivity in $\text{EuFe}_2\text{As}_{1.4}\text{P}_{0.6}$ and compressed EuFe_2As_2 .

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