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Surface geometric and electronic structures of A(Fe, Co)$_2$As$_2$ (A=Ba,Ca) GUORONG LI, V.B. NASCIMENTO, XIAOBO HE, AMAR B. KARKI, JIANDI ZHANG, RONGYING JIN, Dept. of Physics, Louisiana State University, Baton Rouge, LA 70802, USA, A.S. SEFAT, M.A. MCGUIRE, B.C. SALES, Materials Science & Technology Division, ORNL, Oak Ridge, TN 37831, USA, D. MANDRUS, Dept. of Materials Science & Engineering, The University of Tennessee, Knoxville, TN, 37996, USA, WARD PLUMMER, Depart. of Physics, Louisiana State University, Baton Rouge, LA 70802, USA — We utilize Low Energy Electron Diffraction (LEED) to determine the surface structure combined with real-space scanning tunneling microcopy/spectroscopy (STM/STS), to investigate the local geometric and electronic structures at the (001) surface of the compounds of AFe_2As_2 (A= Ba, Ca). In general two competing surface reconstructions are observed with either a 1x2 or a ($\sqrt{2}$x$\sqrt{2}$)R45° (tetragonal notation) structure. The ($\sqrt{2}$x$\sqrt{2}$)R45° structure corresponds to the 1x1 orthorhombic phase. While the ($\sqrt{2}$x$\sqrt{2}$)R45° phase always present for A=Ba, the 1x2 structure dominates for A=Ca. We will discuss the detailed structural change with Co doping, thermal cycling, contamination, electron beam induced damage, and cleaving temperature. Specifically, 1x2 phase is sensitive to the thermal processing, with indications of a temperature dependence phase transition. *Supported by NSF DMR-1002622

Guorong Li
Louisiana State University, LA

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