

SUPPLEMENTAL MATERIAL: One-dimensional Rashba states with unconventional spin texture in Bi chains

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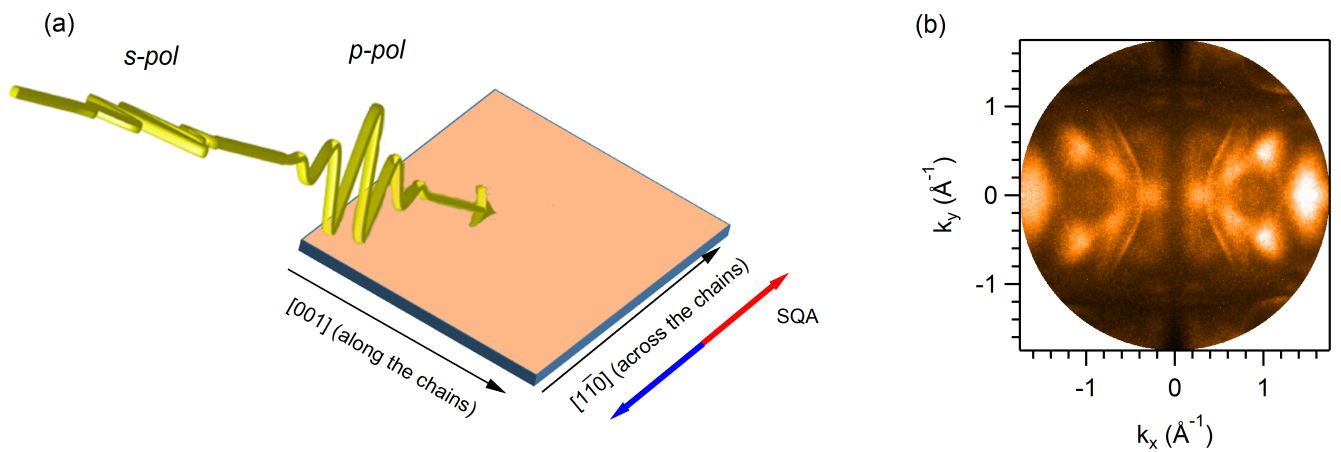


FIG. 1: (a) Experimental geometry and polarization of the light with respect to the crystallographic axis of the sample used in Fig. 2 of main text. In Fig. 3 of the main text and Fig. 2 and Fig. 3 of the Supplemental Material, the sample is rotated by 90° . (b) 2D momentum map taken on clean Ag(110) at 0.55 eV binding energy with 120 eV, *s*-polarized light.

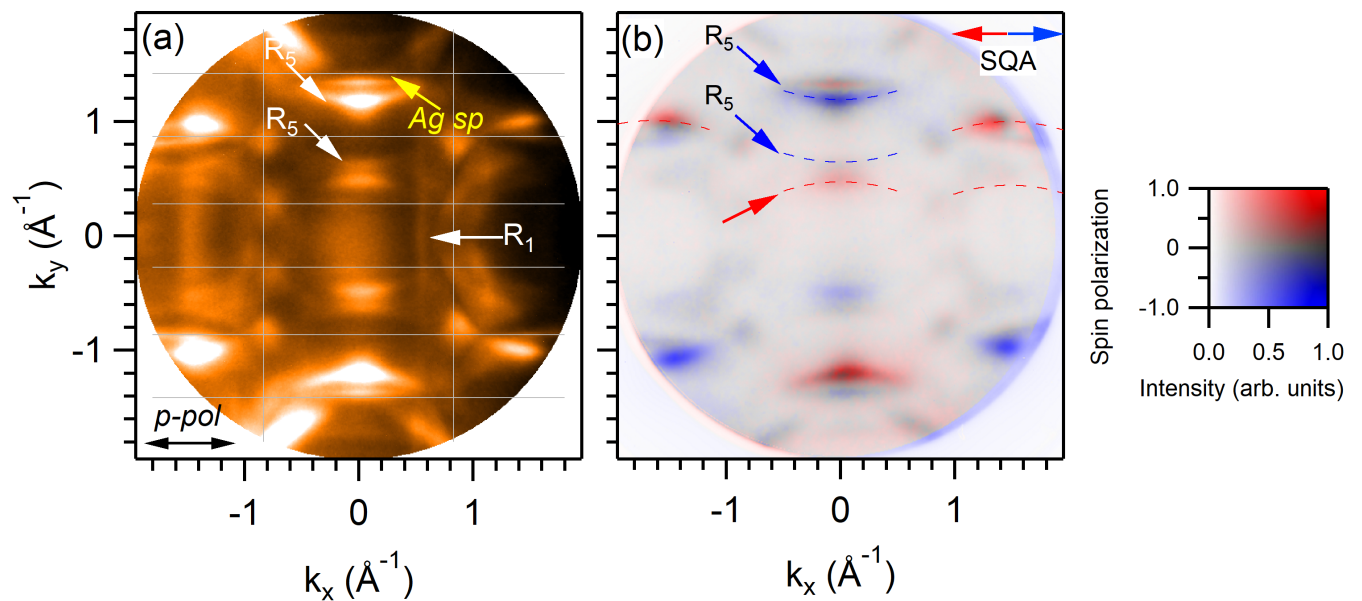


FIG. 2: (a) 2D momentum map taken at 3.0 eV binding energy with 35 eV, *p*-polarized light. (b) Spin-resolved photoemission intensities of the data shown in panel (a). Red and blue intensities correspond to spin-up and spin-down electronic states as shown in the legend. The SQA indicates the spin quantization axis. No spin signal results from the R_1 state, confirming the spin direction being collinear with the constant energy contour.

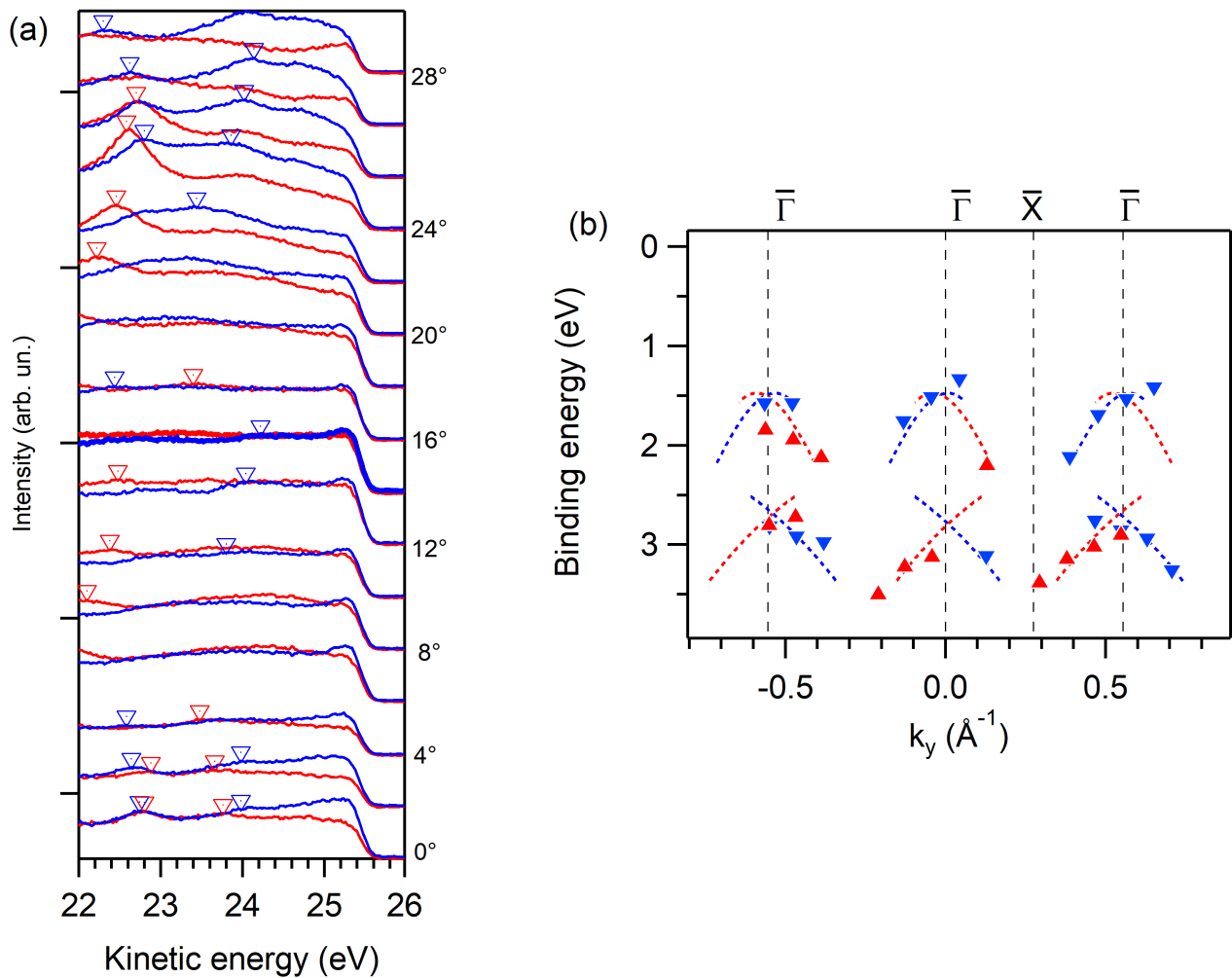


FIG. 3: (a) Spin polarization spectra taken with 30 eV photon energy along the $\bar{\Gamma}$ - \bar{X} direction at NSLS, see the Methods section. Red and blue correspond to up and down spin channel, respectively. Markers indicate the positions of the maxima of the intensity. (b) The positions of the markers from panel (a) converted to k-space and binding energy, lines are guide to the eye.

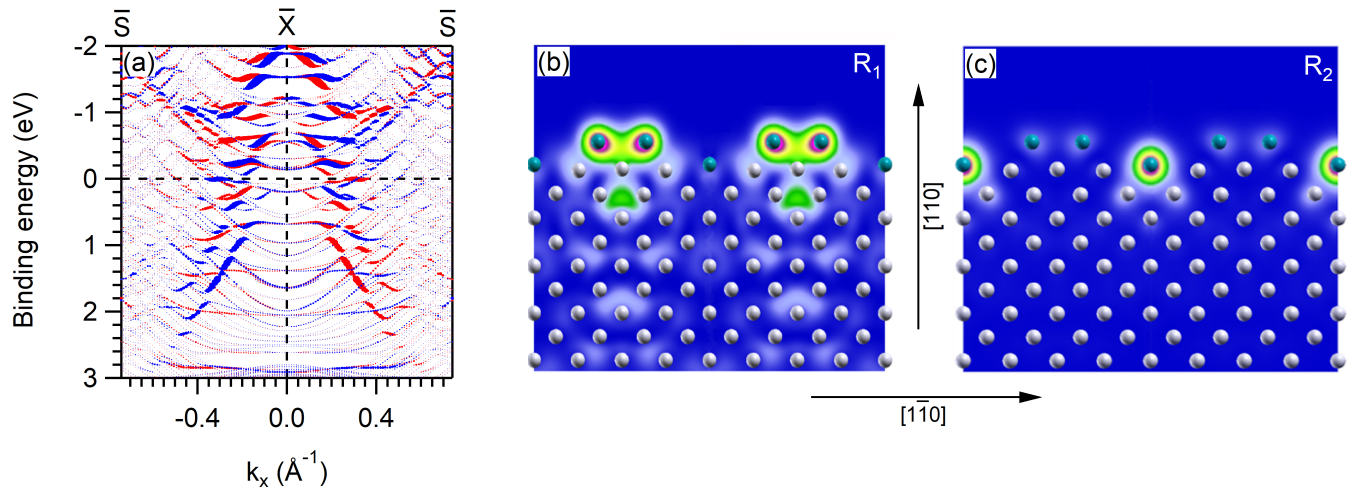


FIG. 4: (a) DFT calculated band structure along the $\bar{X}\text{-}\bar{S}$ direction. The color and size of the symbols indicate the orientation and size of the spin polarization at the Bi atoms in k_y direction. (b,c) charge localization plots extracted at about 0.6 eV binding energy in a (001) plane (perpendicular to the Bi chains) halfway between Bi^1 and Bi^2 atoms, of R_1 and R_2 states, respectively. Bi atoms in blue, Ag atoms in grey.