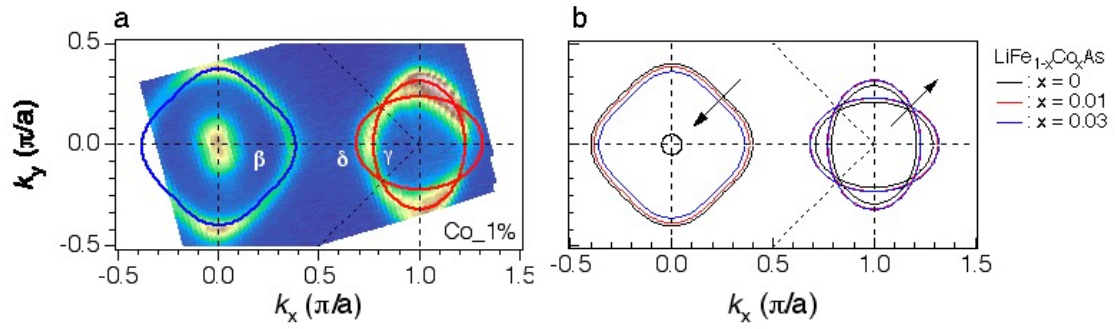
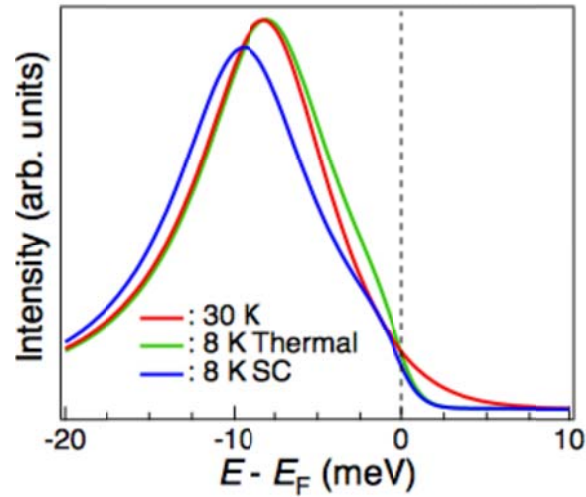


Supplementary Figure 1: Resistivity and magnetic susceptibility of $\text{LiFe}_{1-x}\text{Co}_x\text{As}$. Supplementary Figures 1a and 1b show the resistivity and the magnetic susceptibility of $\text{LiFe}_{1-x}\text{Co}_x\text{As}$. The low residual resistivity and high superconducting (SC) volume prove the high quality of our samples.



Supplementary Figure 2: FS evolution of $\text{LiFe}_{1-x}\text{Co}_x\text{As}$.

Supplementary figure 2a shows the ARPES intensity at E_F of $\text{LiFe}_{0.99}\text{Co}_{0.01}\text{As}$ as a function of the two-dimensional wave vector measured with the He I α line ($h\nu = 21.218$ eV). The intensity is obtained by integrating the spectra within 10 meV with respect to E_F and the energy resolution is set to 14 meV. To directly compare the FSs evolution as a function of doping, we summarized the extracted FSs in supplementary figure 2b. Black, red and blue curves represent the pristine LiFeAs , Co_1% and Co_3% samples, respectively. Our results confirm that the substitution of Co introduces electron carriers and reduces/expands hole/electron FSs.



Supplementary Figure 3: The opening of SC gap vs thermal broadening effect. The main difference between the thermal effect and the opening of a superconducting gap is that the peak position is shifted to lower binding energy if it is caused by thermal broadening, and to higher binding energy if there is a superconducting gap opening. To prove this we show our simulation in supplementary figure 3. The peak width is set to 5 meV. In agreement with our data, the peak position in the superconducting state is shifted to high binding energy, while the thermal effect will shift the peak slightly to the lower binding energy.

Supplementary Table 1: Fitting parameters of the α and β bands. The fitted results by using Eqs. (1), (2), (4), and (5) of the main text are summarized in supplementary table 1.

α band	LiFeAs	LiFeAs	1%Co	1%Co	3%Co	3%Co	3%Co	3%Co
β band	@30 K	@8 K	@30 K	@8 K	@30 K	@8 K	@30 K	@8 K
C_0	1.5	1.6	0.6	0.5	0.9	0.88	0.6	0.8
a_1	487.2	57.7	63.1	24.3	48.5	42.6	172	50
E_k^1 (meV)	0.7	-5.3	-4.0	-6.0	-7.8	-9.0	-0.4	-3.2
Γ_1 (meV)	9.2	3.0	5.2	2.8	6.3	5.6	5.9	3.4
a_2	34.9	156.5	31.7	53.9	55.3	46.1	-	-
E_k^2 (meV)	-15.7	-16.5	-17.8	-18.5	-21.9	-22.4	-	-
Γ_2 (meV)	5.5	5.0	8.6	7.5	11.1	10.2	-	-

Supplementary Table 2: Fitting parameters of the γ and δ bands. The fitted results by using Eqs. (3), (4), and (5) of the main text are summarized in supplementary table 2.

δ band	3%Co@30 K	3%Co@8 K	3%Co@30 K	3%Co@8 K
γ band				
C_0	0.3	0	-	-0.6
C_1	-0.2	1.0	-	1.2
C_2	0.1	-0.8	-	-0.3
a	17.4	3.1	-	5
E_k (meV)	0	-3.5	-	-4
Γ (meV)	8.1	2.5	-	1.2