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Imaging Dirac-Mass Disorder from Magnetic Dopant-Atoms in the Ferromagnetic Topological Insulator $\mathbf{Cr}_x(\mathbf{Bi}_{0.1}\mathbf{Sb}_{0.9})_{2-x}\mathbf{Te}_3$ - Part II

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— We present Part II of the spectroscopic imaging - scanning tunneling microscopy (SI-STM) study of ferromagnetic $Cr_x(Bi_{0.1}Sb_{0.9})_{2-x}Te_3$ single crystals measured at 4.5 K. As Part II we show how both spectroscopic analysis in real and momentum space demonstrate the coincident Dirac mass gap identified. Distribution of gap width, gap center, and gap anisotropy will be discussed. The anticipated relationship $\Delta(r) \propto n(r)$ is confirmed throughout, and exhibits an electron-dopant interaction energy J^* =145 meV·nm^2. These observations reveal how magnetic dopant atoms actually generate the TI mass gap and that, to achieve the novel physics expected of time-reversal-symmetry breaking TI materials, control of the resulting Dirac-mass gap disorder will be essential.

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