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Photo-induced Spin Angular Momentum Transfer into Antiferromagnetic Insulator[1] FAN FANG, YICHUN FAN, XIN MA, College of William and Mary, J. ZHU, Q. LI, T.P. MA, Y.Z. WU, Z.H. CHEN, Department of Physics, Fudan University, Shanghai 200433, China, H.B. ZHAO, Department of Optical Science and Engineering, Fudan University, GUNTER LUEPKE, College of William and Mary, COLLEGE OF WILLIAM AND MARY TEAM, DEPARTMENT OF PHYSICS, FUDAN UNIVERSITY TEAM, DEPARTMENT OF OPTICAL SCIENCE AND ENGINEERING, FUDAN UNIVERSITY TEAM — Spin angular momentum transfer into antiferromagnetic(AFM) insulator is observed in single crystalline Fe/CoO/MgO(001) heterostructure by time-resolved magneto-optical Kerr effect (TR-MOKE). The transfer process is mediated by the Heisenberg exchange coupling between Fe and CoO spins. Below the Neel temperature(TN) of CoO, the fact that effective Gilbert damping parameter α is independent of external magnetic field and it is enhanced with respect to the intrinsic damping in Fe/MgO, indicates that the damping process involves both the intrinsic spin relaxation and the transfer of Fe spin angular momentum to CoO spins via FM-AFM exchange coupling and then into the lattice by spin-orbit coupling.

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