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Elucidating strong coupling between E_{2g} phonon mode and electrons in MgB_2[1] RICHARD PEREZ , YONG-JIHN KIM, OSWALD UWAKEH, University of Puerto Rico - Mayaguez, ERIC HELLSTROM, University of Wisconsin - Madison — Although the isotope effect and the Testardi correlation provide definite proof of the phonon mechanism in MgB_2, the detailed electron-phonon coupling is not clear yet. For instance, point contact and tunneling spectroscopy experiments show only qualitative information on the (strong) coupling between the E_{2g} phonon mode and the electrons that was predicted by theory. Raman scattering and inelastic x-ray scattering demonstrate the anomalously damped and broad E_{2g} phonon mode due to strong electron-phonon coupling. We follow the change of the anomalously broadened linewidth of theE_{2g}mode as the system becomes disordered by impurity substitution and/or ball milling. We expect that the broadening due to the electron-phonon coupling will decrease significantly when T_c is reduced to zero due to weak localization. We combine Raman scattering and resistance ratio data to clarify the importance of the coupling between the E_{2g} phonon mode and the electrons in MgB_2.

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