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New Measurement of Diffusion Thermopower of 2D Electron Systems W.E. CHICKERING, J.P. EISENSTEIN, Caltech, J.L. RENO, Sandia — The thermoelectric properties of low-dimensional electronic systems provide information about carrier transport that is complementary to that obtained from ordinary charge transport. In conventional measurements of the thermopower S of two-dimensional electron systems (2DESs), phonon drag overwhelms the diffusion thermopower S_d of the electron gas for temperatures $T >\sim 0.1$ K. We introduce a new hot electron thermocouple technique which vastly reduces the importance of phonon drag and allows us to accurately determine S_d in a 2DES in a GaAs/AlGaAs heterostructure. Differentially gated 2DES channels provide the analogs of the dissimilar metals used in a conventional thermocouple. The device is calibrated via the temperature dependence of the longitudinal resistance of the 2DES at the thermocouple junction. Our results are in good quantitative agreement with the Mott formula for the temperature and density dependence of S_d for temperatures up to $T \sim 2$ K. This work is supported by DOE grant DE-FG03-99ER45766 and Microsoft Project Q.

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