Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Low-Cost Cavity Ring-Down System For Measurement Of High Reflectivity Semiconductor Mirrors DANIEL TREMBLAY, SUSAN LEHMAN, The College of Wooster — A cavity ring-down system consisting of a half-symmetric optical resonator with a swept cavity design has been constructed from off-the-shelf components in order to investigate ultra-high reflectivity distributed Bragg reflectors (DBRs). Cavity ring-down is a sensitive technique often used for spectroscopy that measures the buildup and decay of laser light within a high finesse optical cavity. Once light is resonant in the cavity, the resonance is interrupted so that the light within the cavity decays. From this measured decay time, the amount of light lost per pass to mirror losses or absorptive and scattering losses is determined. As a measurement of time rather than absolute intensity, cavity ring-down has the advantage of not requiring calibration since it is unaffected by drifts in laser intensity or detector sensitivity. This low-cost ring-down system was designed with one planar mirror and one concave mirror to allow simple conversion to DBR measurement. The concave mirror is mounted on a piezoelectric modulator to enable rapid sweeping of the cavity length, eliminating the need for an acousto-optic modulator to shutter the light off, but increasing the analysis complexity due to Doppler shifting of the light by the moving mirror. A cw-laser tunable over 30 nm is used to probe the cavity and DBR system.

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Date submitted: 30 Nov 2005 Electronic form version 1.4