Reflectivity of Molybdenum laser mirrors

Because molybdenum metal is exceptionally hard and durable, "Moly" mirrors are widely used with high power CO_2 lasers for welding and metal cutting. Other uses are in industrial monitoring, chemical sensing, spectroscopy etc. We often get asked about the optical properties of Molybdenum. Experimental data is scarce, especially at nonstandard angles of incidence, and often doesn't take account of polarisation anisotropy. It is possible to model the optical properties of polished metals, based on the complex refractive index of the metal, and we find there is a very good agreement between the theoretical values, and the few data points we can measure in our test lab (using a CO_2 laser, and a circular polarised beam).

Below are the calculated reflectivity values of polished molybdenum at a few selected wavelengths for 45 degrees incidence. As you can see below, 2 microns wavelength, uncoated bare Mo surfaces aren't greatly reflective.

Wavelength	%R S pol	%R P pol	Phase Shift deg
633nm HeNe	67	43	11
850nm	66	45	11
1064nm Nd:YAG laser	77	60	6
2.94um Er:YAG laser	98.4	96.8	5
4um	98.7	97.6	5
9um	98.9	97.9	1.6
10.6 CO2 laser	98.9	98	1.3
12um	98.9	97.9	1

Theoretical Optical Reflectivity of Molybdenum at 45 Degree incidence

We have the ability to calculate reflectivity and phase shift for a range of metals used as reflectors at varying incidences and wavelengths, for example Aluminium.