Thermochromic materials are of huge interest for the management and storage of thermal energy [1]. Vanadium dioxide (VO₂) is especially suitable for these purposes due to its dielectric-to-metal transition [2], which involve important changes on its electrical, thermal, and optical properties [3] for temperatures around 68 °C. In this study, VO₂ thin films (120 nm and 200 nm of thickness) deposited via laser ablation on sapphire c-cut and r-cut substrates, have been optically characterized using ellipsometric spectroscopy on a wavelength range 0.2 to 18 microns. Using a combination of Cody-Lorentz and Drude oscillators [4], the spectral permittivity and thermal emittance of each sample have been determined as functions of temperature, within the phase transition zone. Moreover, it is shown that the average emissivity on the wavelength range 2?m to 15?m is in good agreement with the corresponding one obtained through the thermal wave resonant cavity (TWRC) [5].

References:

Keywords: Vanadium dioxide, UV-Vis-IR Ellipsometry spectroscopy, Optical properties

Presenting author's email: jorge.ramirezr@cinvestav.mx