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Tungsten Oxide Thin Films Fabricated using Femtosecond and Nanosecond Pulsed Laser Deposition[1] ANTHONY PELTON, ROBERT MAYANOVIC, Missouri State Univ, MISSOURI STATE UNIVERSITY TEAM[2] — Pulsed laser deposition (PLD) is a promising technique for creating inexpensive, nanostructured tungsten oxide thin films which may be suitable for photocatalysis, electrochromic devices and fuel cell electrodes. We have prepared tungsten oxide thin films by using a pulsed femtosecond laser or an excimer (nanosecond) pulsed laser. The PLD Na-incorporated WO_3-based films were deposited on glass and silicon substrates. After deposition, the thin films were annealed to 550 C up to 30 hours in air. The films were characterized using SEM, XRD, Raman Spectroscopy, and XPS, both before and after annealing. Prior to annealing, the Na_xWO_3 films made using the femtosecond PLD (f-PLD) are rougher and display more texture than the films grown using nanosecond PLD (n-PLD). Before annealing, the f-PLD films exhibit both 3-D nano-crystalline and amorphous structures, whereas the n-PLD films are smoother and predominately amorphous before annealing. The post-annealed Na_xWO_3 films show evidence of having several structural phases, including monoclinic, orthorhombic, triclinic and hexagonal; the orthorhombic and hexagonal phases are most likely tungsten bronzes.

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