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Optimal PLD Parameters for Growth of Two Titania Phases without Change of Substrate ALEXANDRA GORDIENKO, ANTHONY KAYE, Texas Tech University — Two pure tetragonal phases of titanium dioxide anatase and rutile were grown on c-cut sapphire substrates via pulsed-laser deposition by changing only the growth and annealing conditions such as ambient gas pressure, substrate temperature and laser pulse repetition rate, and without changing the substrate, target, or working gas. Preliminary data for titania phase diagram is also reported. The production of multiple phases of a material using a single target and a single substrate is critical since changing either one of those can obfuscate correlations between growth conditions and the performance of the resulting film. Further, there is no prior report of the production of anatase titania on sapphire; in fact, the review presented by Janisch et al. predicted that anatase-on-sapphire was "impossible." The optimized protocols were also used for growth of titania on a collection of other substrates, creating a basis for universal anatase and rutile protocol that can be transferred to any substrate. For applications in which titania is used for its optical properties, sapphire substrates may be preferential, as they may significantly decrease the cost of production and increase the survivability of titania films.

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