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Unique PLD Production of Two Pure Titania Phases on Sapphire Substrates ALEXANDRA GORDIENKO, ANTHONY KAYE, TTU — 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. The production of multiple phases of a material using a single target and a single substrate is critical since changing either the target or the substrate 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." 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 assuming the induced strain does not affect the final performance of the system.

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