Title: Phase growth control in low temperature PLD Co: TiO2 films by pressure

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Abstract: This paper reports on the structural and optical properties of Co-doped TiO2 thin films grown onto (0001)Al2O3 substrates by non-reactive pulsed laser deposition (PLD) using argon as buffer gas. It is shown that by keeping constant the substrate temperature at as low as 310 degrees C and varying only the background gas pressure between 7 Pa and 70 Pa, it is possible to grow either epitaxial rutile or pure anatase thin films, as well as films with a mixture of both polymorphs. The optical band gaps of the films are red shifted in comparison with the values usually reported for undoped TiO2, which is consistent with n-type doping of the TiO2 matrix. Such band gap red shift brings the absorption edge of the Co-doped TiO2 films into the visible region, which might favour their photocatalytic activity. Furthermore, the band gap red shift depends on the films' phase composition, increasing with the increase of the Urbach energy for increasing rutile content. (C) 2012 Elsevier B.V. All rights reserved.

Author Keywords: Co-doped TiO2; Non-reactive PLD; Background pressure; Rutile; Anatase; Optical band gap

KeyWords Plus: Pulsed-laser deposition; Thin-films; Optical-properties; Photocatalytic activity; Nanoparticles

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