Title:	Understanding the physical properties of thin TiO2 films treated in different thermal atmospheric conditions
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Abstract:	Titanium dioxide (TiO2) based thin films are very promising due to their potential applications in thin film based dye-sensitized, perovskite and Cd-based solar-cells, therefore, air and vacuum annealing evolution to physical properties of compact TiO2 films is undertaken herein. Thin films of thickness 50 nm were grown employing electron-beam deposition followed by annealing in air atmosphere and vacuum where the films are found amorphous in nature. In air annealing, decrement in optical absorbance is observed with annealing while transmittance is increased in lower and middle visible region up to 300 °C whereas opposite trend is observed for films treated with vacuum annealing. The electrical measurements showed ohmic-nature of films and the conductivity is improved in vacuum annealing. The surface topographical studies reveal that surface roughness is found to vary with the temperature of air annealing. Findings facilitate to apply these as buffer and transport layers to develop dye-sensitized, Cd-based and perovskite solar cells.
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