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**Performance of TiO<sub>2</sub> films obtained by cathodic arc deposition as carbon monoxide gas sensor**Adriana Márquez<sup>1</sup>, Ariel Kleiman<sup>1</sup>, Diego Lamas<sup>2</sup><sup>1</sup>Plasma Physics Institute - FCEN, UBA, Buenos Aires, Argentina <sup>2</sup>Centro de Investigaciones en Sólidos , CONICET-CITEDEF, Villa Martelli, Argentina

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Titanium dioxide has been widely investigated in the last years due to its outstanding physical and chemical properties that turned it into an interesting material for several technological applications such as oxidant gas sensors. Anatase, a crystalline metastable phase of the TiO<sub>2</sub> that can be retained in nanocrystalline materials, is an n-type semiconductor characterized by high electron mobility in which the concentration conduction electron is dependent on the surrounding atmosphere. Thus, anatase films as ceramic gas sensors are based on distinct resistance changes in the presences of gasses. An efficient technique to produce thin films due to its high deposition rate and the high adherence of the coatings is cathodic arc deposition (CAD). The structure of films produced by CAD depends significantly on the substrate temperature during the coating process.

In this work TiO<sub>2</sub> thin films prepared by CAD on glass and silicon substrates were characterized toward its implementation in gas sensors. The films were grown in an oxygen environment (~2 Pa) employing a 100 A continuous arc. They were synthesized at 400 °C and at room temperature. The films obtained at 400 °C grew mainly in anatase phase with the presence of small quantities of rutile phase, while films synthesized at room temperature resulted amorphous and were crystallized in anatase phase with a post-annealing at 400 °C. The crystal structure of the films was studied by x-ray diffraction in the glancing angle geometry, the morphology was observed by atomic force microscopy and reflectance measurements in the visible range were also performed. The film electrical conductivity was investigated at room temperature and in the temperature range 400~500°C in air and with CO concentrations varying from 20 to 200 ppm.

**Keywords**titanium dioxide  
cathodic arc  
gas sensor