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## **Materials Processing by Plasma in Powder Metallurgy at LABMAT-Brazil\***

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Glow electrical discharge has been shown to be an effective method of modifying surface properties of materials. In recent years the Materials Sciences Laboratory (LABMAT) of the Federal University of Santa Catarina has developed a joint research program between the plasma and the powder metallurgy research teams. dc glow discharges have been used in metal surface modification, as, for example, in nitriding and nitrocarburizing, as well as in powder metallurgy processes including debinding and sintering. An attempt to produce hard metal WC-Co samples has also been successful. More recently, plasma microwave processing has been employed in the production of interstitial  $\text{Sm}_2\text{Fe}_{17}\text{N}_x$ , a uniaxial magnetic alloy. Some of these processes have already been registered and patented and there are prototype and industrial reactors functioning in the laboratory and in industry, respectively.

While the behavior of macroscopic parameters is often known, there is a lack of information regarding the physical and chemical details of the plasma-surface interaction processes involved, a knowledge of which is essential for process modeling. In an effort to rectify this, optical emission spectroscopy and mass spectrometry plasma diagnostic techniques were applied in investigations in our laboratory. The identification of reactive chemical species in the plasma allowed physico-chemistry studies to be undertaken and correlations to be established between the processing plasma and the metals and polymers under treatment.

In the present work, an overview of the main aspects related to the processes under investigation in our laboratory will be discussed.

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