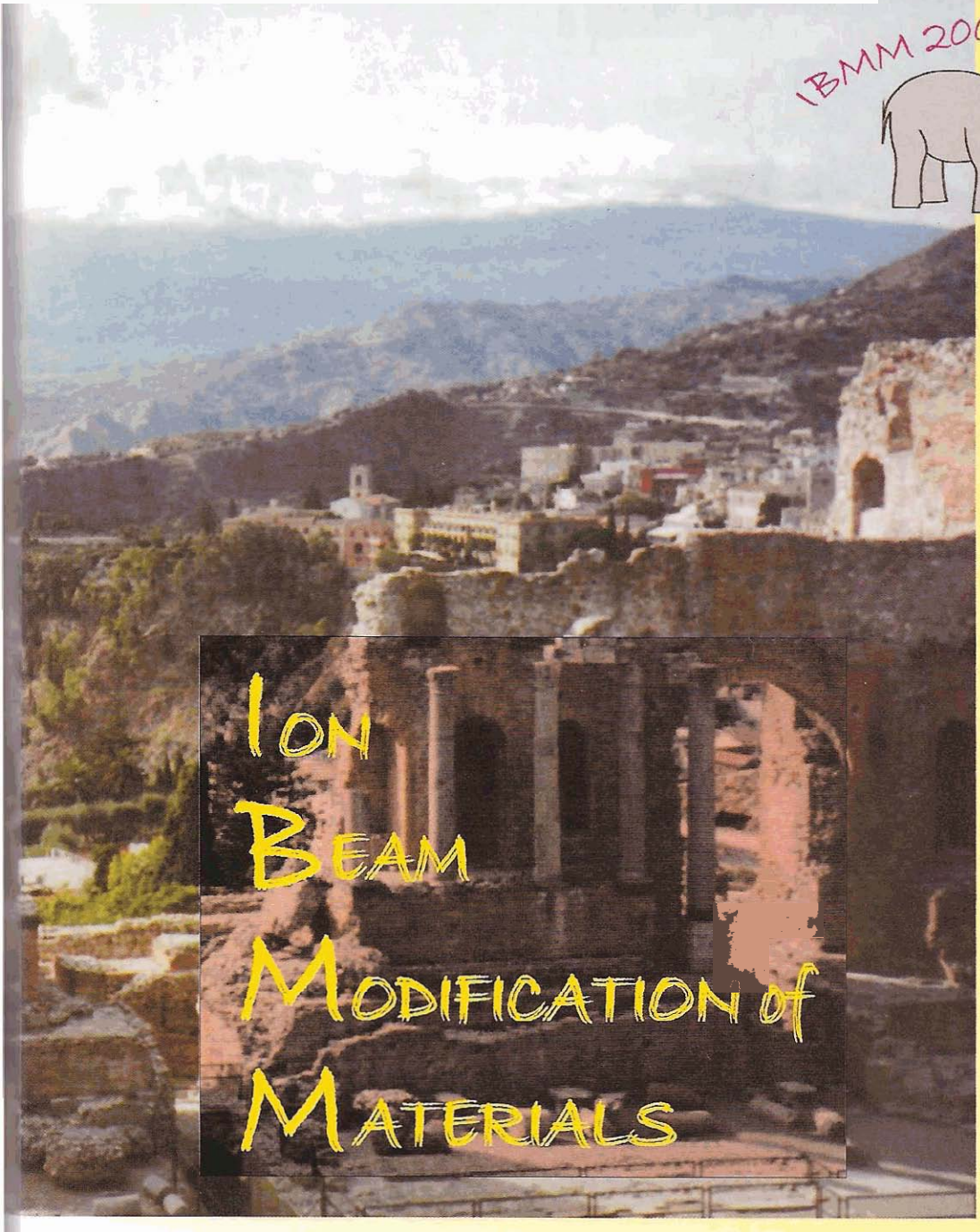

IBMM 2006

Ion Beam Modification of Materials

Program and Abstracts

15th International Conference

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Characteristics of end Hall ion sonrce with magnetron hollow cathode discharge

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An end Hall ion source with magnetron hollow cathode discharge is described. The source is suitable for high cnrrent, low energy ion beam applications such as Hall current plasma accclerators. The end Hall ion source is based on an anode layer thruster with closed-drift electrons that move in a closed path in the $E \times B$ field. Only a simple magnetron power supply is used in the ion source. The special configurations enable uninterrupted and expanded operation with oxygen as well as other reactive gases becanse of the absence of an electron source in thc ion sourcc. In our evaluation, the ion beam current was measured by a circular electrostatic probe and the energy distribution of the ion beam was measured by means of a retarding potential analyzer (RPA). An ion beam current density of up to 10 mA/cm^2 were obtained at the mean ion energy 100-250 eV using Ar or O_2. The ion source can be operated in a stable fashion at a discharge voltage range between 200 V and 500 V and without additional electron triggering. The discharge power of the ion source can bc easily changed by adjusting the gas flow rate and anode voltage. No water cooling is needed for power from 500 W to 2 kW. The simple and rugged ion source is suitable for industrial applications such as thin film deposition to increase adhesion. The operational characteristics of the ion source and applications to materials snrface modification and polymer films are cxperimentally presented and discussed.