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Energy Distribution of Aluminum Multicharged Ions Generated from Laser Plasma MD HAIDER SHAIM, ALEXEY BUGAYEV, HANI E. ELSAYED-ALI, Department of Electrical and Computer Engineering and the Applied Research Center, Old Dominion University, Norfolk, Virginia 23529, USA — Multicharged ion sources are an emerging tool for nanoprocessing and nanofabrication. The higher charge state of multicharged ions has significant potential energy equal to the sum of ionization energies of stripped electrons. Multicharged ion interaction with solids involves the release of this potential energy that causes electronic exchange interaction along with the electronic excitation. We report on measurement of aluminum multicharged ion energy distribution generated by laser ablation of an aluminum target. A Q-switched Nd:YAG laser is used to ablate the aluminum target in an ultrahigh vacuum while an electrostatic time-of-flight spectrometer is used to detect the laser-generated multicharged ions. An increase in the ions' signal and generation of higher charge state is observed with the increase of laser ablation energy. The energy distribution of ions for increasing laser fluence shows an increase in the ion energy along with narrowing of the distribution. Applying an accelerating voltage to the aluminum target increases the charge extraction and the energy of multicharged ions. Angular distribution of the multicharged ions is dependent on the ion charge state. Multicharged ions up to Al^{+4} are detected.

Md Haider Shaim
Department of Electrical and Computer Engineering and
the Applied Research Center, Old Dominion University,
Norfolk, Virginia 23529, USA

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