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Group IIB-VIA Semiconductor Oxide Cluster Ions

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ABSTRACT

Metal oxide cluster ions, $M_nO_m^{\pm}$ ($M = \text{Zn}, \text{Cd}$) and Hg_nO_m^- of various stoichiometry have been generated from solid IIB-VIA semiconductor oxides targets, $(\text{ZnO}_{(s)}, \text{CdO}_{(s)}, \text{ and } \text{HgO}_{(s)})$ by using pulse laser desorption ionization time of flight mass spectrometry with a laser of $\lambda=355\text{nm}$. Analysis of mass spectral data indicates the formation of stoichiometric cluster ions viz., $(\text{ZnO})_{n=1-30}^+$ and $(\text{CdO})_{n=1-40}^+$ along with $-$ O bound anions, $(\text{ZnO})_{n=1-30}\text{O}^-$, $(\text{CdO})_{n=1-40}\text{O}^-$ and $(\text{HgO})_{n=1-36}\text{O}^-$ from their respective solids. Further, metal oxoanions such as $\text{ZnO}_{n=2,3}^-$, $\text{CdO}_{n=2,3,6}^-$, and $\text{HgO}_{n=2,3,6,7}^-$ have also been noted signifying the higher coordination ability of both Cd and Hg with $\text{O}/\text{O}_2/\text{O}_3$ species.

Keywords: ZnO, CdO, HgO, Semiconductor oxide clusters, Laser desorption ionization, TOFMS,

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