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Mechanistic study of negative ion emission from single crystal alkali halide surfaces due to pulsed UV laser irradiation[1] J. T. DICKINSON, Washington State University, KENICHI KIMURA, Research Institute, National Printing Bureau of Japan, Odawara, Kanagawa 256-0816 Japan, S. C. LANGFORD, Department of Physics, Washington State University, Pullman, WA 99164 — We report on extensive measurements of negative alkali ion emission from four alkali halides during exposure to 248-nm pulsed excimer laser radiation at fluences well below the threshold for optical breakdown. A detailed study on the emissions from single crystal KCl shows no evidence for negative halide ions, suggesting that negative alkali ions are not formed by electron attachment to thermally emitted neutral particles. Furthermore, the KCl surface charges positively during laser irradiation (due to electron emission from defects), which would hinder direct emission of negative ions from the surface. We present strong evidence for a negative ion formation mechanism involving double electron attachment to singly charged positive alkali ions. Extension of these measurements to single crystal KBr and to other dielectric materials confirm this mechanism.

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