Abstract Submitted for the MAR10 Meeting of The American Physical Society

Coulomb explosion in femtosecond laser-cluster interactions¹ CHRISTIAN CHENARD-LEMIRE, LAURENT J. LEWIS, Universite de Montreal, MICHEL MEUNIER, Ecole Polytechnique de Montreal — The products of laser ablation of thin film or bulk materials and the laser fragmentation of clusters depend strongly on the actual process that leads to the ejection of matter. For fs pulses, a few thermal and non-thermal processes have been identified. In this study, we assess the importance of the cold Coulomb Explosion (CE) process in various situations. While it is understood that CE can become important at high fluences for large-gap dielectrics, it remains unclear whether or not it can occur in semiconductors and metals. In order to clarify this issue, we have used computer simulations to model the interaction of fs laser pulses with cluster of C (diamond), c-Si and Al. We use a novel approach (electron Force Field) that allows the electronic and ionic excitations for relatively large scale (a few thousand atoms) systems to be simulated at the quantum level. Preliminary results for C clusters show that CE is very important even at fluences near threshold; small c-Si clusters also show evidence of CE.

¹Work supported by NSERC and FQRNT.

Christian Chenard-Lemire Universite de Montreal

Date submitted: 19 Nov 2009 Electronic form version 1.4