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**Ion pulses from laser-plasma acceleration for materials processing**[1] THOMAS SCHENKEL, SVEN STEINKE, LIESELOTTE OBST-HUEBL, JIAN-HUI BIN, QING JI, ARUN PERSAUD, Lawrence Berkeley National Laboratory, HUSSEIN HIJAZI, LENNARD C. FELDMAN, Rutgers University, KEI NAKAMURA, ANTHONY GONSALVES, STEPAN S. BULANOV, CAMERON G. R. GEDDES, CARL SCHROEDER, ERIC ESAREY, Lawrence Berkeley National Laboratory — We report on ion acceleration at the BELLA PW laser (~$10^{19}$ W/cm$^2$, up to 1 Hz). Proton and carbon ion pulses with intensities in the $10^{12}$ ion/shot range are characterized with a Thomson parabola for energies above 2 MeV. We quantify the flux of lower energy ions through implantation into silicon wafers and ex situ analysis and find that carbon ions with energies below 2 MeV are implanted with fluences of ~$10^{14}$ atoms/cm$^2$/shot. Intense ion pulses excite and heat targets, leading to evaporation of aluminum and annealing of defects in silicon. We discuss opportunities for materials processing and qubit synthesis with intense ion pulses from laser-plasma acceleration. The work is supported by the U.S. Department of Energy Office of Science, under Contract No. DE-AC02-05CH11231.

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Thomas Schenkel
Lawrence Berkeley National Laboratory

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