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High repetition rate saturated output lasers in nickel-like ions at wavelengths down to 13.2 nm M.A. LAROTONDA, Y. WANG, B.M. LUTHER, D. ALESSI, M. BERRILL, V.N. SHLYAPTSEV*, J.J. ROCCA, Colorado State University, *University of California Davis. NSF EUV ERC — There is significant interest in the development of compact high-average-power soft-x-ray lasers for a variety of applications in imaging, spectroscopy, plasma diagnostics, and metrology. In particular, there is a need for the development of compact sources of coherent light at wavelengths within the bandwidth of the Mo–Si mirrors centered at 13.5 nm for at-wavelength metrology related to extreme ultraviolet lithography. Soft x-ray laser operation at this wavelength have been limited to one shot every several minutes due to inefficient plasma heating. In this work we report the first demonstration of high repetition rate operation of saturated lasers emitting in this spectral region. Operation at 5 Hz repetition rate generated an average power of 1-2 μW at 13.9 and 13.2 nm in the $4d_1S_0$–$4p_1P_1$ transitions of Ni-like Ag and Ni-like Cd ions respectively. The results were obtained by efficiently heating a plasma an with 8 ps pulse of only 1 J energy impinging at grazing incidence. Laser amplification at wavelengths as short as 10.9 nm was also observed by isoelectronic scaling these results along the Ni-like ion sequence. These table-top lasers can be expected to enable numerous new applications of intense coherent soft x-ray light. Work supported by the NSF EUV ERC, Award EEC-0310717 and by the US Department of Energy.

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