Abstract Submitted
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100 Hz repetition rate, high average power, plasma-based soft x-ray lasers[1] BRENDAN REAGAN, KEITH WERNSING, CORY BAUMGARTEN, MARK BERRILL, LEON DURIVAGE, FEDERICO FURCH, ALDEN CURTIS, BRADLEY LUTHER, DINESH PATEL, CARMEN MENONI, VYACHESLAV SHLYAPTSEV, JORGE ROCCA, Colorado State University — Numerous applications demand high average power / high repetition rate compact sources of coherent soft x-ray radiation. We report the demonstration table-top soft x-ray lasers at wavelengths ranging from 10.9nm to 18.9nm from plasmas created at 100Hz repetition rate. Results includes a record average power of 0.15mW at λ =18.9nm from a laser-produced Mo plasma and 0.1mW average power at λ =13.9nm from a Ag plasma. These soft x-ray lasers are driven by collisional electron impact excitation in elongated line focus plasmas a few mm in length heated by a compact, directly diode-pumped, chirped pulse amplification Yb:YAG laser that produces 1J pulses of ps duration at 100Hz repetition rate. Pulses from this laser irradiate the surface of polished metal targets producing transient population inversions on the $4d^1S_0 \rightarrow 4p^1P_1$ transition of Ni-like ions. Tailoring of the temporal profile of the driver laser pulse is observed to significantly increase soft x-ray laser output power as well as allow the generation of shorter wavelength lasers with reduced pump energy.

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