

Abstract Submitted
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CW Coherent Soft X-Ray Laser MARVIN NIIMURA, Physical Optics Corporation — CW Soft X-Ray Laser (CW-SXL) lasing at the “water window” wavelengths (2.3 - 4.4 nm) is indispensable for CW structural (3D) study of biological polymers such as DNA and proteins. Unlike pulsed X-ray (laser) sources, CW-SXLs have a higher beam quality and do not rely on a high power pulsed laser. The electronic structure necessary for lasing soft X-ray lines is obtainable from a CW source of highly charged ions (HCIs). Soft X-ray emission due to the interaction of HCIs with neutral atoms is taking place in the quasar and cometary gases. Solar and (quasar’s) stellar winds are naturally occurring CW sources of HCIs, for which a modern electron cyclotron ion source (ECRIS) can be used in laboratory. Appropriate X-ray cavity (equipped with Bragg reflector) and re-circulating neutral gas atoms can achieve the laser action at water window. Population inversion takes place naturally since the electron transfer from neutral gas atom to HCI is readily a Rydberg pumping, no TW pump laser, as used for pulsed X-ray source, is needed. My preliminary calculation has indicated that the achievable gain-length product $gL = 2.16 - 6.48$ with the laser output power $P > 26.4$ kW, exceeding the level of pulsed X-ray source.

Marvin Niimura
Physical Optics Corporation

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