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Characteristics of soft x-ray spectra from ultra-fast micro-capillary discharge plasmas[1] JING LI, GONZALO AVARIA, VYACHESLAV SHLYAPTSEV, FERNANDO TOMASEL, MICHAEL GRISHAM, NSF Center for Extreme Ultraviolet Science and Technology, Colorado State University, Fort Collins, CO 80525, QUINCY DAWSON, Department of Physics, Morehouse Colleage, Atlanta, GA, 30314, JORGE ROCCA, NSF Center for Extreme Ultraviolet Science and Technology, Colorado State University, Fort Collins, CO 80525, NSF CENTER FOR EXTREME ULTRAVIOLET SCIENCE AND TECHNOLOGY COLLABORATION — The efficient generation of high aspect ratio (e.g. 300:1) plasma columns ionized to very high degrees of ionization (e.g. Ni-like Xenon) by an ultrafast current pulses of moderate amplitude in micro-capillary channels is of interest for fundamental plasma studies and for applications such as the generation of discharge-pumped soft x-ray lasers. Spectra and simulations for plasmas generated in 500 um alumina capillary discharges driven by 35-40 kA current pulses with 4 ns rise time were obtained in Xenon and Neon discharges. The first shows the presence of lines corresponding to ionization stages up to Fe-like Xe. The latter show that Al impurities from the walls and Si (from injected SiH_4) are ionized to the H-like and He-like stages. He-like spectra containing the resonance line significantly broaden by opacity, the intercombination line, and Li-like satellites are analyzed and modeled. For Xenon discharges, the spectral lines from the Ni-like transitions the $3d^9 4d(3/2, 3/2)_{J=0}$ to the $3d^9 4p(5/2, 3/2)_{J=1}$ and to $3d^9 4p(3/2, 1/2)_{J=1}$ are observed at gas pressures up to 2.0 Torr.

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