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Performance optimisation of a neon DBD excimer light source operating in the extreme-ultraviolet (84nm) ROBERT CARMAN, B.K. WARD, D.M. KANE, Macquarie University — We have investigated the electrical and optical characteristics of a windowless dielectric barrier discharge (DBD) excimer lamp using Neon to generate output at ∼84nm in the extreme-ultraviolet (EUV) spectral range. A detailed comparison of Ne DBD lamp performance for both pulsed and sinusoidal voltage excitation waveforms has been undertaken using otherwise identical operating conditions. Compared to sinusoidal excitation, pulsed operation yields a ∼50% increase in the overall electrical to EUV conversion efficiency, and also allows greater control of parameters associated with the temporal evolution of the EUV pulse shapes (risetime, peak power, pulse width) due to a synchronised breakdown of the discharge gap along the electrode length. The ability to tailor EUV pulse shapes is important for applications in materials processing and surface cleaning. The source is also found to be highly monochromatic with respect to its spectral output at ∼84nm which dominates the spectral emission over the wavelength range 30-550nm. The overall lamp performance, as measured by the EUV output power, electrical to EUV conversion efficiency, and spectral purity at ∼84nm, improves with increasing gas pressure up to 900mb with none of these parameters showing saturation characteristics.

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