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Publication Date

2002-07-17

Large Diameter Alumino-Silicate K⁺ Sources for HIF Experiments*

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Surface ionization sources are used in Heavy Ion Fusion (HIF) experiments because they can provide bright, high current beams. Recently we have made new alumino-silicate K⁺ sources for the Neutralized Transport Expt. (NTX) and the High Current Transport Expt. (HCX). The source diameters are 2.54 cm and 10 cm respectively and they have demonstrated ion currents of 80 mA and 600 mA for typical HIF pulse lengths of 5 - 10 μ s. The corresponding current density is $\sim 10 - 15 \text{ mA/cm}^2$, but much higher current density has been observed using smaller size sources. Under normal usage, an alumino-silicate source can last for many months of operation. This long life is in agreement with the low level of neutral atom emission detected in our experiments. One noteworthy achievement is the improved technique in fabricating large diameter sources with high quality alumino-silicate coating on tungsten substrates. We will present beam data obtained from these sources and discuss the method of fabrication and quality control procedures.

*This work has been performed under the auspices of the US DOE by UC-LBNL under contract DE-AC03-76SF00098, for the HIF Virtual National Laboratory.

Abstract submitted to APS-DPP Nov. 2002