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Development of a RF-Driven H-/H+ Surface Plasma Ion Source for the Spallation Neutron Source JEFFREY BREITSCHOPF, JERRY CARR JR., Texas Lutheran University, VADIM DUDNIKOV, ROL JOHNSON, Muons Inc., ROBERT WELTON, MARTIN STOCKLI, SYDNEY MURRAY, MANUEL SANTANA, TERRY PENNISI, BAOXI HAN, CHIP PILLER, ORNL — A Surface Plasma ion Source (SPS) equipped with an external Saddle-type Antenna (SA) powered by 13.56 MHz Radio Frequency (RF) was tested at the Spallation Neutron Source (SNS) test stand at the Oak Ridge National Laboratory. Hydrogen ions were extracted from the source, and modifications were implemented to increase the ion beam output and optimize cooling. The source was tested under a duty factor of 5-100% at 150Hz with power ranging from 0.8 to 3.3 kW. Cesium was also used to optimize the H- beam output. The highest beam current the source produced was 15 mA at 3 kW of RF power with an ion production efficiency of $\sim$ 5 mA/kW. The current ion source at the SNS produces 30-40 mA of H- ($\sim$ 1 mA/kW) of accelerated beam, operating with 50-60 kW of RF power and a duty factor of 6%. Future work will be to test the SA RF SPS under the conditions and requirements of the SNS. The development of alterative sources for the SNS, such as this one, may figure prominently in future facility and reliability upgrades.

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