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Effort Towards a High Intensity Titanium Beam with the VENUS ECR Ion Source

Recent superheavy element production research has involved the bombardment of heavy-element foils by high currents of neutron-rich ion beams having atomic numbers near 20 and energies near 5 MeV/nucleon. Production rates scale with incident current, and the 88-Inch Cyclotron at LBNL has demonstrated the ability to deliver over 2 pμA for some of these beams largely because of its injector: the superconducting ECR ion source VENUS. The search for the next elements on the periodic table, elements 119 and 120, will likely involve 50Ti as the incident beam. Titanium is a difficult beam to produce as it requires relatively high temperatures to sublimate material into the source (~1700 C). In addition, the material itself acts as a getter metal on chamber surfaces making stable source operation difficult during and after a high intensity run. As a result, the reported titanium currents on target worldwide were limited in the hundreds of pnA. By using a "boat"oven design capable of withstanding the strong Lorentz forces in VENUS, we have been able to demonstrate 48Ti currents on target in excess of 1.4 pμA. We will present the oven improvements that made this possible and will discuss our next steps as we aim for 2 pμA.

Funding Agency

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I have read the Code of Conduct to attend ICIS2023.

Yes

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