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Advanced Rocket Propulsion Technologies Boron Vapor Source for HEDM

 Authors: [Paul C. Nordine](#); [CONTAINERLESS RESEARCH INC EVANSTON IL](#)

Abstract: The research reported here is directed to the development of a **boron** vapor source for application in HEDM research. Specific goals of the research were (i) a **boron** vapor flux that allows formation of transparent solid p_{H2} with high concentrations of **boron** dopant species, up to 5 molar %, (ii) a design for integration with the cryo-solid spectroscopy equipment at AFRL/PRSP, Edwards Air Force Base. The **boron** vapor source was fabricated and tested. Its performance was demonstrated to agree well with the diffuse free evaporation model. CO₂ laser beam heating and melting of the **boron** samples was shown to yield intrinsic control of the **boron** sample temperature at the melting point, and a well-controlled **boron** flux. The **boron** vapor flux obtained with the apparatus is sufficient to prepare **boron**-doped p_{H2} HEDM solids at rates of 100 micrometers/ hour at **boron** concentrations of 1.4 mol %, and at much higher rates at smaller **boron** concentrations. A Phase II SBIR proposal was prepared and submitted to the Air Force.

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