

## Progress on DCLL Blanket Module Concept

C.P.C. Wong<sup>1</sup>, M. Abdou<sup>2</sup>, N. Morley<sup>2</sup>, B. Merrill<sup>3</sup>, S. Smolentsev<sup>2</sup>, E. Marriott<sup>4</sup>,  
M.E. Sawan<sup>4</sup>, M. Youssef<sup>2</sup>, Y. Kato<sup>5</sup>, R.J. Kurtz<sup>6</sup>, B.A. Pint<sup>5</sup>, A. Lumsdaine<sup>5</sup>,  
M.J. Schaffer<sup>1</sup>, S. Willms<sup>7</sup>, and B. Williams<sup>8</sup>

<sup>1</sup>*General Atomics, PO Box 85608, San Diego, California 92186-5608*

<sup>2</sup>*University of California Los Angeles, Los Angeles, California 90095-1597*

<sup>3</sup>*Idaho National Laboratory, Idaho Falls, Idaho 83415*

<sup>4</sup>*University of Wisconsin Madison, Wisconsin 53706*

<sup>5</sup>*Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831*

<sup>6</sup>*Pacific Northwest National Laboratory, Richland, Washington 99352*

<sup>7</sup>*ITER Organization, Route de Vinon sur Verdon, 13115 St. Paul lez Durance, France*

<sup>8</sup>*Ultramet Inc., Pacoima, California 91331*

Under the US Fusion Nuclear Science and Technology Development program, we have selected the Dual Coolant Lead Lithium concept (DCLL) as our primary Test Blanket Module (TBM) for testing in ITER. The DCLL blanket concept has the potential to be a high performance DEMO blanket design with a projected thermal efficiency of >40%. Reduced activation ferritic/martensitic (RAF/M) steel is used as the structural material. The self-cooled breeder PbLi is circulated for power conversion and for tritium breeding. A SiC-based flow channel insert is used as a means for magnetohydrodynamic pressure drop reduction from the circulating liquid PbLi and as a thermal insulator to separate the high-temperature PbLi (~700°C) from the helium-cooled RAF/M steel structure. We have been developing the mechanical design and performing neutronics, structural and thermal hydraulics analyses of the DCLL TBM module. We are also making progress on related R&D needs to address critical DEMO blanket development issues. To prepare for testing in ITER, an estimate of the necessary ancillary equipment that will be needed at the ITER site and a detailed safety impact report have been prepared. Presently, we are functioning as the Interface Coordinator for the DCLL blanket concept. Our position is to contribute to the development of an effective TBM Program Implementation Plan, and to provide general support (e.g., DIII-D experiments on TF ripple effects) for the benefit of all members. This paper will be a summary report on the progress and results of recent work.

This work was supported in part by the US Department of Energy under DE-FC02-04ER54698, DE-FG02-08ER54984, DE-FG02-09ER54513, and DE-AC05-00OR22725.