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## **SESSION 8: Magnetic Refrigeration**

Paper 8.1 Wednesday POSTER Session

1:15 to 2:45 PM

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### ***Development of 50W-Class Active Magnetic Regenerative Refrigerator for Hydrogen Liquefaction***

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The National Institute for Materials Science (NIMS) is developing a high-efficiency magnetic refrigerator for hydrogen liquefaction that will contribute to the coming hydrogen energy society. Magnetic refrigeration is a cooling method that utilizes the magnetocaloric effect and can achieve refrigeration efficiency that is difficult to achieve with existing gas-compression refrigeration systems. In this research, a hydrogen liquefier is being developed using a method of magnetic refrigeration called Active Magnetic Regeneration Refrigeration (AMR), which differs from adiabatic demagnetization refrigeration, or ADR, in that it uses the regeneration effect of many small magnetic particles rather than bulk, and thus can be operated over a wider temperature range than an ADR. In this study, as the magnetic material, HoAl<sub>2</sub> with a transition temperature of 39 K, which is close to the hydrogen liquefaction temperature (about 20 K), is employed, and the magnetic field required for the magnetocaloric effect is generated by a superconducting magnet using NbTi wires. In this study, we report on the development of a 50 W-class AMR for hydrogen liquefaction at 20 K.