DOE Hydrogen and Fuel Cells Program Record	
Record #: 5037	**Date:** May 22, 2006
Title: Hydrogen Storage Materials - 2004 vs 2006	
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Approved by: JoAnn Milliken	**Date:** May 22, 2006

Item:

"Identified materials with 50 percent improvement in hydrogen storage capacity from 2004 to 2006."

Supporting Information:

In 2004 and 2005, one of the promising materials reported for hydrogen storage in the class of metal hydrides was based on lithium amide (chemical formula: $LiNH_2$). By modifying this material with magnesium (Mg), it was shown by researchers at Sandia National Laboratory (Livermore) that 5.2 percent by weight of hydrogen could be stored within the material.

See: W. Luo, "($LiNH_2$-MgH_2): a viable hydrogen storage system", J. Alloys and Compounds, 381, 284-287 (2004) and "Development of Metal Hydrides at Sandia National Laboratory", J. Wang in the DOE Hydrogen Program 2005 Annual Merit Review Proceedings, http://www.hydrogen.energy.gov/pdfs/review05/stp_62_wang.pdf.

Between 2004 and 2006, the DOE established its National Hydrogen Storage Project with three Centers of Excellence on metal hydrides, chemical hydrogen storage, and carbon-based materials, as well as independent projects on hydrogen storage.

One example of progress in hydrogen storage capacity within the class of metal hydride materials is destabilized hydrides. In 2005 and 2006, researchers at HRL showed destabilized hydrides, specifically destabilized lithium borohydride (chemical formula: $LiBH_4$) with hydrogen storage capacities ranging from 5.4-9.6 weight percent. See: "Thermodynamically Tuned Nanophase Materials", G. Olsen and J. Vajo in the DOE Hydrogen Program 2005 Annual Merit Review Proceedings, http://www.hydrogen.energy.gov/pdfs/review05/stp_28_olson.pdf and "Thermodynamically Tuned Nanophase Materials for Reversible Hydrogen Storage", G. Olsen and J. Vajo in the DOE Hydrogen Program 2006 Annual Merit Review Proceedings.

An improvement in hydrogen storage capacity by over 50% would enable materials with over 7.8 weight percent (from 5.2 weight percent). Due to the early stage of materials research, a conservative estimate of improvement is reported. In addition, the temperatures and pressures required for hydrogen absorption and release within materials must be improved. Experimental results clearly show that between 2004 and 2006, the materials developed show an improvement of over 50% in hydrogen storage capacity (weight percent).