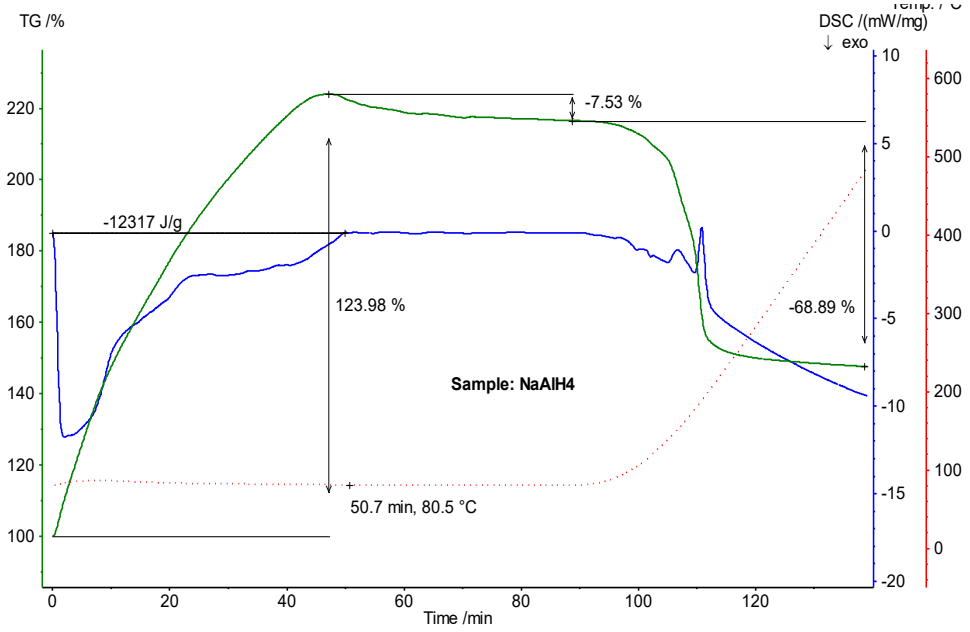
APPLICATION**SHEET**

Inorganics · Research & Development
STA 2500 *Regulus*

Metal Hydrides

Introduction

Various metal hydrides are currently being studied for use as a means of hydrogen storage material in fuel cell-powered electric cars and batteries. They are also important in organic chemistry as powerful reducing agents and many promising applications in hydrogen economy. In this hypothetical future economy, hydrogen is proposed as fuel to replace gasoline and diesel fuels currently used in automobiles. Complex hydrides such as sodium aluminium hydride or lithium borohydride are capable of storing hydrogen with the same density as that of methane, without requiring the energy input methane requires to release hydrogen as free atoms.



Test Conditions

Temperature range:	RT ... 500°C
Heating/cooling rates:	Various
Atmosphere:	N_2/10%H_2O at 110 ml/min
Sample mass:	9.60 mg
Crucible:	Al_2O_3
Sensor:	TGA-DSC type S

Test Results

Simultaneous TGA and DSC was measured on an $NaAlH_4$ sample under humid atmosphere using a water vapor furnace. The sample temperature was first kept constant at 80°C and finally heated up to 500°C. Immediately at the beginning of the experiment, the sample mass increased due to the reaction of $NaAlH_4$ with water vapor. During this process which is strongly exothermal as can be seen from the DSC signal, hydroxides are formed and hydrogen is released. Upon heating above ~100°C, these hydroxides are decomposing leading to the formation of the corresponding oxides. In that regime, the endothermal DSC signal was strongly affected by foaming of the sample.

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