



*Special Issue Reprint*

## **Functional Materials Based on Metal Hydrides**

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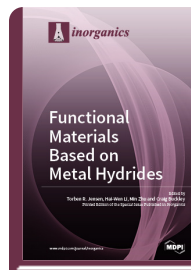
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Our extreme and growing energy consumption, based on fossil fuels, has significantly increased the levels of carbon dioxide in the atmosphere, which may lead to global and irreversible climate changes. We have plenty of renewable energy, e.g., sun and wind, but the fluctuations over time and geography call for a range of new ideas and, possibly, novel technologies. The most difficult challenge appears to be the development of the efficient and reliable storage of renewable energy. Hydrogen has long been considered as a potential means of energy storage; however, storage of hydrogen is also challenging. Therefore, a wide range of hydrogen-containing materials, with energy-related functions, has been discovered over the past few decades. The chemistry of hydrogen is very diverse, and so also are the new hydrides that have been discovered, not only in terms of structure and composition but also in terms of their properties. This has led to a wide range of new possible applications of metal hydrides that permeate beyond solid-state hydrogen storage. A variety of new hydrides, proposed as battery materials, has been discovered. These can exploit properties as fast ion conductors or as conversion-type electrodes with much higher potential energy capacities, compared to materials currently used in commercial batteries. Solar heat storage is also an area of great potential for metal hydrides, in principle offering orders of magnitude better storage performance than phase change materials. Recently, hydrides with optical and superconducting properties have also been investigated. This Special Issue of *Inorganics*, entitled “Functional Materials Based on Metal Hydrides”, is dedicated to the full range of electronic, photonic, and energy-related, inorganic and hydrogen-containing



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