# Synthesis, structure and properties of ternary metal superhydrides

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Pressure-stabilized hydrides are a new rapidly growing class of high-temperature superconductors, which is believed to be described within the conventional phonon-mediated mechanism of coupling. The remarkable properties of $H_3S$ ($T_C$=200 K, [1]), $YH_{6-9}$ ($T_C$=224-243 K [2, 3]) and $LaH_{10}$ ($T_C$=250 K [4]) at 150-200 GPa catalyzed the search for superconductivity in compressed ternary (X,Y)-H polyhydrides that can be obtained by pulsed laser heating of various alloys and intermetallics with hydrogen in diamond anvil cells. In this report we will present new results of studies of high-pressure chemistry, magnetic and superconducting properties of novel ternary $LaYH_{20}$ [5], $(La, Nd)H_{10}$, $(Y, Mg)H_6$ as well as several interesting binary $CeH_{9-10}$ [6], $BaH_{12}$ [7]and $SrH_{22}$ [8] polyhydrides discovered in the last 2 years by collaboration of Institute of Crystallography RAS, LPI, Skoltech (Russia) and Jilin University (China). Results of recent experiments in pulsed magnetic fields up to 70 T and perspectives of design of light and magnetic sensors (SQIUD) based on superhydrides will be discussed.

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