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**Automotive Applications of Physics and Materials Research: Permanent Magnets, Thermoelectrics,
and Hydrogen Storage**

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Advances in the research and development of new materials continue to have a major impact on the automotive industry and on many other technologies today. A physics background in materials provides a research scientist with many opportunities to pursue a very satisfying and successful career doing industrial and applied physics, ranging from discovering and characterizing new and technologically useful materials to always learning something new in science. For example, the use of permanent magnets in the auto industry was revolutionized by the discovery at General Motors Research and Development Center of a new iron based magnetic material $\text{Nd}_2\text{Fe}_{14}\text{B}$. Moreover, this material rapidly became the state-of-the-art permanent magnet in a wide range of applications across many technologies beyond automotive. More recently, with growing pressure to improve efficiencies of automobiles and other energy consumers, thermoelectrics are a very exciting class of energy conversion materials that have seen dramatic advances in performance. General Motors is at the leading edge of research and development on automotive waste heat recovery using thermoelectric materials. Today, the very promising fuel cell future of the auto industry relies, in part, on advances in on-board alternative fuel storage. New materials and schemes for hydrogen storage that will help bring automotive fuel cell technology to fruition is a rapidly advancing field of physics and materials research. In this presentation, I will discuss my work in these areas during my career at General Motors Research and Development Center.