

# **New light weight metal as formable as aluminum sheet metal with 1.5 times higher strength**

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Comparison of newly developed and conventional magnesium alloy sheets after they were subjected to Erichsen tests. Credit: National Institute for Materials Science

A research team at NIMS and Nagaoka University of Technology developed high strength magnesium sheet metal that has excellent formability comparable to that of the aluminum sheet metal currently

used in body panels of some automobiles. The alloy uses only common metals, and is expected to be a low-cost light weight sheet metal for automotive applications.

Magnesium [alloys](#) are roughly 75% lighter than steels and 33% lighter than [aluminum](#) alloys and their usage as structural materials in automotive bodies is expected to be effective in weight reduction for better fuel efficiency. However, virtually no magnesium alloys are used in automotive bodies because of their high processing cost originating from the poor formability and low strength of magnesium [sheet](#) metals.

The research team recently developed a new age-hardenable [magnesium](#) alloy: Mg-1.1Al-0.3Ca-0.2Mn-0.3Zn (numbers indicate constituent elements by atomic percentage), named AXMZ1000. The newly developed alloy has excellent room temperature formability comparable to that of medium strength aluminum alloys that are used in some automobile bodies. In addition, the new alloy is 1.5 to 2.0 times stronger than the aluminum alloy. The excellent formability was achieved by adding very small amounts of zinc (Zn) and manganese (Mn), which led to the formation of fine grain structures, and the high strength was accomplished by adding aluminum (Al) and calcium (Ca), which induced the strengthening of the alloy by the formation of atomic clusters.

The newly developed alloy is composed of only common metals, so the material cost is not expensive. Also, it can be rolled into sheets using simple processes and heat treatments commonly used for aluminum alloys. The newly developed alloy overcomes the long-standing issues for [magnesium alloys](#)—namely, low strength and poor room temperature formability. As the processing cost of the new material is expected to be low, there is good potential for practical applications in automotive bodies or casing of notebook computers and cell phones for their weight reduction.

This study was conducted as a part of the JST Advanced Low Carbon Technology Research and Development Program (ALCA).

This study was published in *Scripta Materialia* on June 16, 2017.

**More information:** M.Z. Bian et al. A heat-treatable Mg–Al–Ca–Mn–Zn sheet alloy with good room temperature formability, *Scripta Materialia* (2017). [DOI: 10.1016/j.scriptamat.2017.05.034](https://doi.org/10.1016/j.scriptamat.2017.05.034)

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