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High Strength Nanotwinned Al Alloys with 9R Phase

A novel aluminum alloy film exhibits exceptionally high strength and ductility, offering a lightweight material comparable to the best high-strength steel for automotive, construction, and military applications.

Currently, the increasing demand for high-strength, lightweight automotive-grade materials, makes the development of novel, ultra-strong, ductile aluminum (Al) alloys a priority. In addition, there is an unmet need for fabricating high-strength Al alloys and high-strength Al alloy coatings without compromising ductility and without attendant softening phenomenon observed in nanocrystalline metals and alloys.

Researchers at Purdue University have developed a high-strength aluminum alloy film via the introduction of 9R phases in the nanostructure. In compression tests performed inside a scanning electron microscope, researchers' found that the resulting alloy films have very high flow stress, i.e., > 1600 MPa, comparable to the best high strength steel currently on the market. Furthermore, the alloy has high work hardening capability and ductility.

Advantages:

-High strength, high ductility

-Inexpensive, bimetallic alloy

Potential Applications:

-Skyscraper construction

-Vehicles

-Military use

Related Publications:

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