# Recyclable composites help drive net-zero goal

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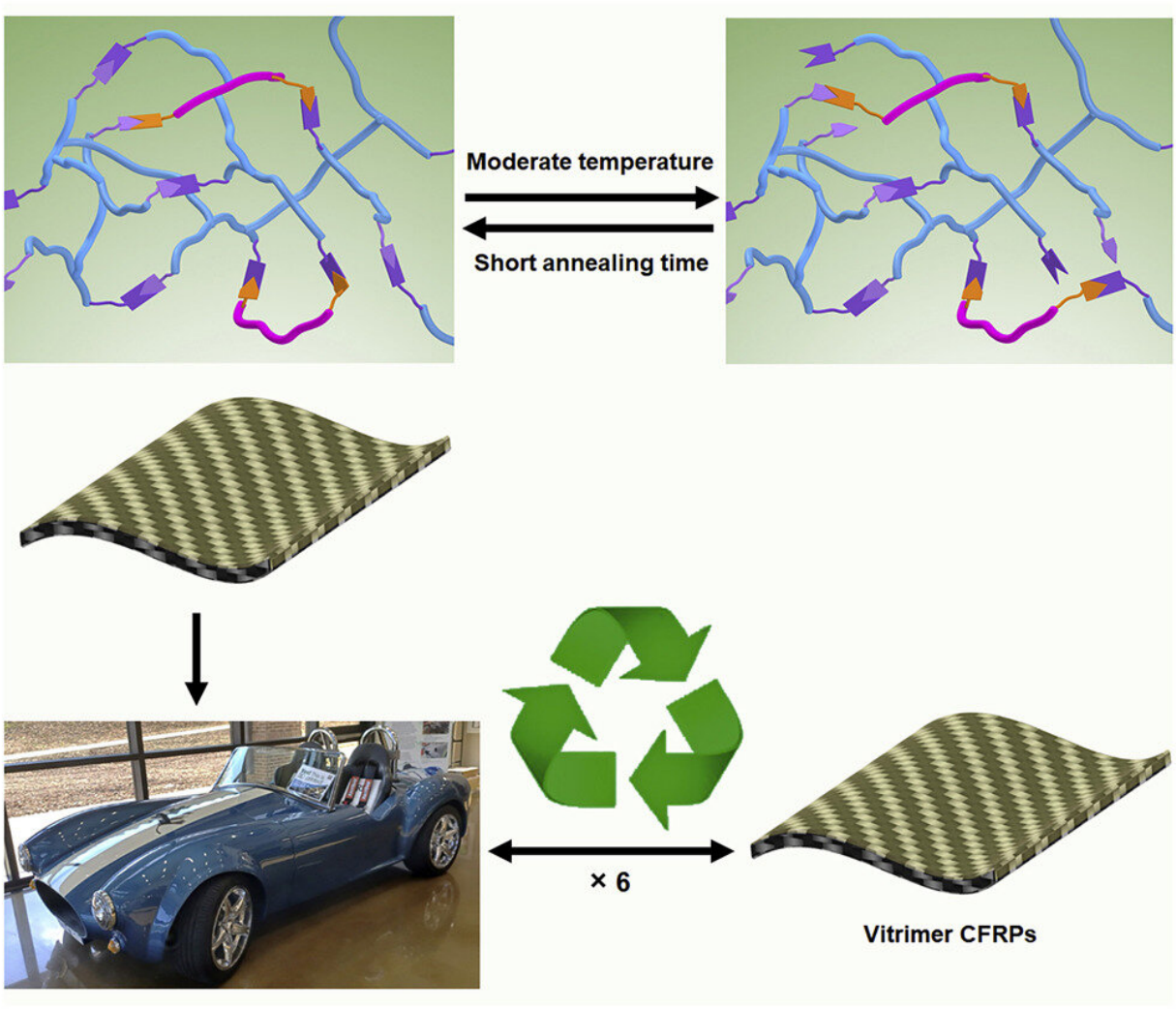

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Oak Ridge National Laboratory scientists designed a recyclable polymer for carbon-fiber composites to enable circular manufacturing of parts that boost energy efficiency in automotive, wind power and aerospace applications.

Carbon-fiber composites, or fiber-reinforced polymers, are strong, lightweight materials that can help lower fuel consumption and reduce emissions in critical areas such as transportation. However, unlike metal competitors, carbon-fiber composites are not typically recyclable, meaning wider adoption could present waste challenges.

"Our goal is to extend the lifecycle of these materials by making reuse possible without sacrificing performance," said ORNL's Md Anisur Rahman.

The team's approach incorporates dynamic covalent bonds that are reversible, enabling both carbon fiber and polymer recycling. The new polymer maintained mechanical strength in six reprocessing cycles, a sharp contrast to previously reported polymers.

"ORNL's carbon-fiber composites enable fast processing and can be repaired or reprocessed multiple times, opening pathways to circular, low-carbon manufacturing," said ORNL's Tomonori Saito.

The research was published in *Cell Reports Physical Science*.

**More information:** Zhengping Zhou et al, Unraveling a path for multi-cycle recycling of tailored fiber-reinforced vitrimer composites, *Cell*

*Reports Physical Science* (2022). DOI: 10.1016/j.xcrp.2022.101036

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