NEW FIBRE-REINFORCED HYDROGEL IS TOUGHER THAN METAL

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A hydrogel is a superabsorbent gel made of natural or synthetic polymers. They can absorb up to 99.5 per cent water in volume. Because they can be made from natural polymers, the substance has potential as a structural biomaterial. Unfortunately, no material was reliable or strong enough for long term use, until now. Researchers at Hokkaido University (JP) created fibre-reinforced soft composites, or a tough hydrogel combined with woven fibre fabric. The new material is highly flexible, tougher than metals, and have a wide range of potential applications.

The team combined hydrogels containing high levels of water with glass fibre fabric to create reinforced plastics. The combination of polyampholyte (PA) gels, a gel they developed earlier, and glass fibre fabric with a single fibre (measuring around 10µm in diameter) creates a strong tensile material.

The fibre-reinforced hydrogels, with a 40 per cent water level, are environmentally friendly. According to the press release, "when used alone, the fibre-reinforced hydrogels developed by the team are 25 times tougher than glass fibre fabric, and 100 times tougher than hydrogels – in terms of the energy required to destroy them." The hydrogel composites are also about 5 times tougher compared to carbon steel.

The new material can be used, for example, in fashion, manufacturing, or as artificial ligaments and tendons, which are subject to strong load-bearing tensions.

Photos: Hokkaido University / Pexels

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