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Japan fabricates polymer-DNA gel that could be used in tissue regeneration and robotics

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DNA design brings predictability to polymer gels

Scientists at Hokkaido University in Japan have made a tuneable, elastic and temperature-sensitive gel by using complementary DNA strands to connect star-shaped polymer molecules together. The gel, and the method used to develop it, could lead to advances in tissue regeneration, drug delivery and soft robotics.

Scientists have long been looking for better ways to develop gels that can be used in a variety of applications, including in the fields of medicine and engineering. Ideally, such gels need to be predictable in their behaviour, self-healing and durable enough for the rigorous jobs they are intended for.

"Our findings suggest that we will be able to fabricate DNA gels with on-demand viscoelastic properties by making use of already available data on DNA thermodynamics and kinetics. The aim will be to improve the understanding and applications of this class of gel", said the researchers.

The team used software programs to simulate the formation of different DNA sequences and their complementary strands, and to determine how these double strands respond to changes in temperature. Their aim was to identify complementary DNA sequences that would only disconnect above 63°C in order to ensure a potential gel's stability in the human body.