Scientists from ITMO, Tel Aviv University and University Aveyir have developed a way to improve the web of spiders to use it in robotics and flexible electronics. To do this, a solution with magnetic nanoparticles was administered into the silk glands of spiders.

The web is stronger than Kevlar, elastic, resistant to high and low temperatures, light and biomedic. These properties make it promising for medicine, robotics and electronics. For example, the web can be used for flexible parts of robots or substrates for microcircuits.

The new method allows you to increase the strength of the web by 82%. Researchers introduced FE3O4 nanoparticles directly into the silk glands of spiders. The particles changed the structure of the protein of the sprout from which the web is formed, increasing the share of β-lists-the elements responsible for the strength and rigidity of the fiber. At the same time, the web retains its lightness and flexibility, and nanoparticles give it magnetic properties.

This opens up the opportunity to create soft robots with elastic “joints” that can be controlled using a magnetic field. In addition, modified silk can be used as a wear -resistant and flexible base for miniature electronics.