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NIT Rourkela turns waste proteins into hydrogels with potential wound-healing applications

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The research team has secured an Indian Patent for the developed technology



Researchers from the National Institute of Technology (NIT) Rourkela have found a way to repurpose inactive proteins discarded by pharmaceutical companies. Prof. Harekrushna Sahoo, Prof. Monalisa Mishra and Prof. Devendra Verma have converted these waste materials into hydrogels with potential applications in wound healing, tissue regeneration and drug delivery.

Proteins are delicate molecules. Exposure to heat, chemicals or harsh processing conditions can cause them to lose their three-dimensional structure. Once unfolded, the molecules tend to stick together, forming clumps known as aggregates. This aggregation causes proteins to lose their biological function. As a result, pharmaceutical and biotechnology companies typically discard them.

The NIT Rourkela research team has developed a process to convert these discarded proteins into wound-healing microgels. To achieve this, the team heated the BMP-2 proteins to about 85°C for ten minutes, which made them unfold. Chemical reactions then made the unfolded proteins clump together. As the next step in the process, the hydrogen peroxide and hyaluronic acid was added to these clumps to turn them into a gel form.

In lab scale tests, the researchers filled the hydrogel with antibiotic ampicillin and checked its drug releasing capabilities, suggesting its potential use in targeted drug delivery. The gel also supported the growth of fibroblasts, the cells responsible for wound healing.

As the next step, the research team plans to build biological models to test how safe and effective the hydrogel is as a therapy.