

## Lead Inventors

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## Unmet Need

Bandages and gauzes are common devices used in clinical settings to treat an assortment of wounds. While bandages and gauzes are effective in treating low grade or hemorrhage wounds, they are limited in their success in treating more complex and / or chronic, non-healing wounds.

These traditional wound dressings may not adequately fit all parts of the body and can result in infection if the respective dressing is not replaced regularly. Because they are absorbent, they do not inherently create a moist environment within the wound bed, which is needed for proper vascularization. Further, bandages and gauzes are not biodegradable, creating excess waste.

Hydrogels have been increasingly recognized for their effectiveness in treating unique, chronic and / or deep wounds, including ulcers and severe burns. They also are aqueous in nature, which promotes a moist wound bed environment, beneficial for vascularization. However, commercially available hydrogel dressings have been found to maintain poor mechanical strength<sup>1</sup> and are not naturally porous in nature.

As a result, there remains a need for hydrogel wound dressings that improve vascularization provided by a porous architecture with adequate mechanical strength, while simultaneously benefiting from the natural moist environment created by the hydrogel within the wound bed.

## Opportunity

Dr. Jonnalagadda and his colleagues have invented a honeycomb shaped, bio-printed hydrogel product, which is or can be embedded with an antibiotic to be used as a wound healing aid. The dressing is applied and removed from the patient painlessly and, given the aqueous nature of the hydrogel, has soothing effects when first applied.

Most importantly, the Jonnalagadda team's hydrogel dressing may be dried out for transportation and storage purposes and reconstituted in well under 10 minutes in three commonly available media, including deionized water and saline solutions. Further, the inventors have found that the reconstituted hydrogel maintains its mechanical strength. The ability to dry and reconstitute this hydrogel dressing is highly valuable for uses in remote locations and potentially provides utility for field hospitals and battlefields, where storage capabilities of saturated hydrogel dressings may be limited.

The porous nature of this biocompatible hydrogel scaffold enables neovascularization, essential to proper wound healing. The scaffold provides architecture onto which cells can attach and repopulate the wound bed and can release a topical antibiotic to prevent infection as the wound heals. The scaffold is easily integrated into the wound bed and, importantly, will not impede the formation of new vasculature. The honeycomb shape provides maximum physical integrity with the bio-printed material, helping ensure that the scaffold will persist in the wound bed as healing progresses. Because the dressing is bio-printed, makers or manufacturers can tailor the hydrogel dressing to specific shapes and sizes to cover specific or general regions of the body.

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<sup>1</sup> Hydrogel promotes wound healing better than traditional bandages, gauzes. American Institute of Physics, February 2021.

The increasing number of burn injury cases and diabetes is expected to drive the global demand for novel dermal regeneration templates and other advanced wound care products. The Dermal Regeneration Template market size was valued at \$1.1 billion in 2023, and is projected to reach \$2.9 billion by 2033, growing at a CAGR of 10.2% from 2024 to 2033.<sup>2</sup>

### **Unique Attributes**

- Honeycomb architecture promotes regenerative healing and enhances mechanical strength.
- May be embedded with antibiotics; easily integrated into the wound bed.
- May be dried and reconstituted providing easy transport to distant locations with reduced shipping and carrying weight.
- Reconstitution time well under 10 minutes; multiple commonly available media, deionized water and saline solutions.
- Customizable printing for specific body region applications.

### **Clinical Applications**

Clinical applications include wounds that are deep or chronic, such as Diabetic Foot Ulcers (DFUs), or wounds caused by traumatic injury such as burns.

### **Stage of Development**

Proof of concept and laboratory prototype.

### **Intellectual Property**

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### **Collaboration or Licensing Opportunity**

Actively seeking licensee for commercialization.

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<sup>2</sup> Dermal Regeneration Market, by Type (Fortified, Fenestrated, Single Layer) , by Application (Burn Injuries, Acutely Excised Wounds, Chronic Wounds, Others), by End User (Hospital, Wound Care, Others) : Global Opportunity Analysis and Industry Forecast, 2024 - 2033 Allied Market Research, October 2024.