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Advanced Wound Care Adhesives with New Functional Properties

Valeria Chiaula¹², Piotr Mazurek¹, Anders Christian Nielsen², Jens Tornøe², Anne Ladegaard Skov¹

¹. Danish Polymer Centre, Department of Chemical and Biochemical Engineering, Technical University of Denmark, Saltofts Plads 227, 2800 Kgs. Lyngby, Denmark
². Coloplast A/S, Humlebæk, Denmark

Introduction

Wound healing is a dynamic process characterized by three overlapping cellular phases: inflammation, new tissue formation, and remodeling. Chronic wounds, which are often manifested in elderly and diabetic patients, result from anomalies in the cellular and molecular wound repair mechanism. Such wounds can lead to significant disability, amputation, and increased mortality. The understanding of the normal wound healing mechanism and the consideration of the complexity of the wound environment, given e.g., hypoxia or bacterial infections, are crucial factors in order to develop an effective therapeutic approach. Here, we propose a novel, skin-friendly, industrially relevant silicone/glycerol hybrid adhesive with new functional properties, including: improved moisture handling due to the incorporation of emulsified glycerol and dispersion of active compounds by glycerol-embedding. This particular matrix paves the way for an innovative drug delivery system. Various parameters will be taken into account in order to develop a relevant adhesive, in particular glycerol content, glycerol domain size and adhesive thickness.

Background

Wound Healing: 4 Cellular Phases

- **Hemostasis**
  - Blood clot formation
- **Inflammation**
  - Microbial infection control
- **Remodeling**
  -细胞 migration and matrix deposition
- **Chronic Wound Healing Process**
  - Bacterial infection
  - Hyperproliferation epidemis: stalled re-epithelialization
  - Persistent inflammation

Focus: Appropriate Dressing for Appropriate Wound Environment

- Immerseable in water
- Immerseable in bacteria
- Absorbent: gas and moisture
- Maintains appropriate humidity in the wound
- Provides thermal insulation

Development of Novel, Skin-Friendly Glycerol-Silicone Hybrid Adhesive

Silicone Adhesives – Gentle Skin Adhesion Properties

- Improved moisture handling
- Incorporation of emulsified glycerol
- Release of active compounds
- Glycerol-incorporation of active compounds
- Beneficial skin care effects
- Glycerol

Experimental Work and Results

**Stability and Morphology of the Emulsions: G20_SA as Example**

- **Glycerol X phr**: Glycerol weight amount per hundred parts of silicone
- **SA**: S stands for silicone, A stands for adhesive
- **GX_SA**: G stands for glycerol, X stands for glycerol phr, which is glycerol weight amount per hundred parts of silicone

**Release of Active Compounds: G20_SA and G40_SA Profiles**

**References**


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