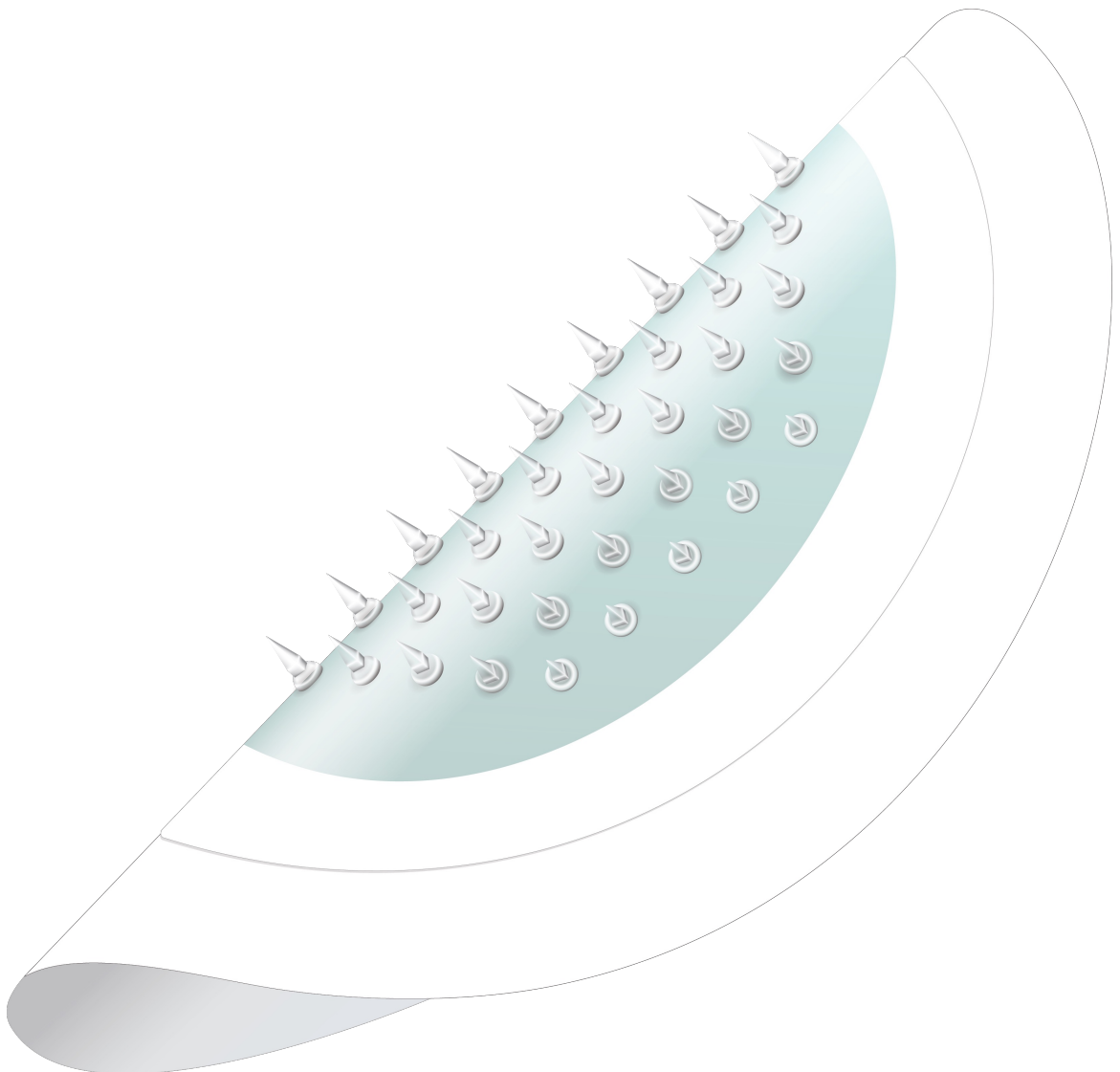




**MINEED**  
*TECHNOLOGY*

Transdermal & Intradermal Delivery





# About MiNeed

Mineed Technology develops the proprietary detachable dissolvable microneedle technology platform. We utilize detachable microneedle technology to develop cosmetic, tattoo, and pharmaceutical applications. The following distinguishes Mineed's dissolvable microneedles from others':

1) *Delivery mechanism:* Rather than relying on the dissolution of microneedles in the skin for delivery, our delivery mechanism consists of the embedding of microneedles into the skin and their immediate detachment from their base. This enables the application time of Mineed's microneedles to be completed in 30 seconds, and there is no patch left on the skin.

2) *Reliability and efficacy of delivery:* The detaching technology provides a delivery efficiency of 90 percents, regardless of the payload percentage and water solubility of the bioactives in the needles.

3) *Types and amounts of the loaded bioactives:* Without the restriction of rapid dissolution and with only the needles' penetrability in mind, we are able to incorporate both hydrophobic and hydrophilic compounds into our microneedles at up to 50 percent loading content.

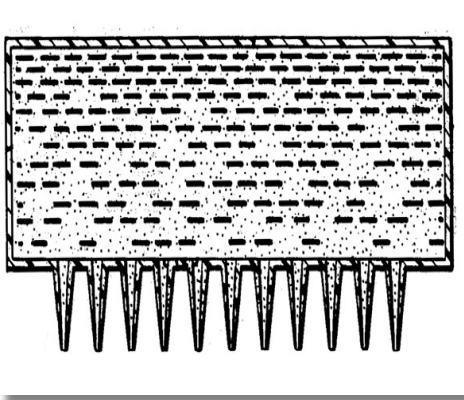
For cosmetics, Mineed investigates, develops, and manufactures a variety of cosmetic products utilizing its detachable microneedle technology. We operate as a contract manufacturer for cosmetic brands.

For tattoos, Mineed investigates, designs, and conducts safety and pattern-longevity tests in addition to manufacturing self-applicable semipermanent and permanent tattoos.

For the pharmaceutical industry, Mineed focuses on collaborative research and development of various medical applications employing detachable microneedle technology for the intradermal or transdermal delivery of selected active pharmaceutical ingredients. Local and systemic medications, vaccines, and diagnostics are examples of applications.



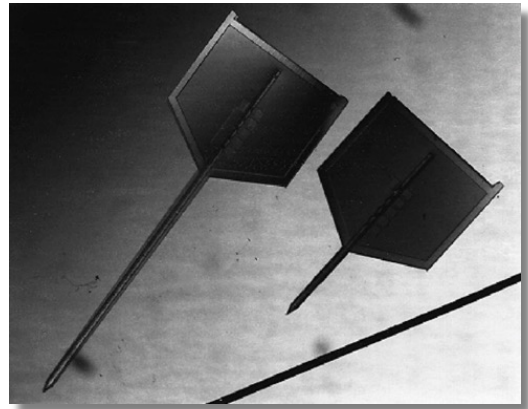
# What is wrong with microneedles?



The concept being patented  
Gerstel et.al.  
"Drug delivery device"  
1976

Alza Corporation, Palo Alto, Calif  
US patent No.3,964,482

17 yrs

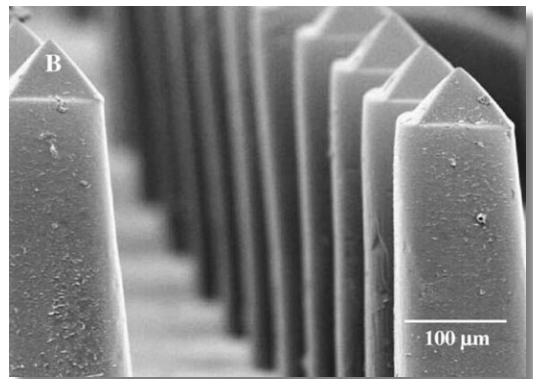


1<sup>st</sup> microneedle being fabricated  
Lin et. al.  
"Single crystal microneedle"  
1993

Int. Conf. Solid-State Sens. Actuators, 4th,  
Yokohama, pp. 237-40,1993



12 yrs



Early dissolvable MN  
"Jung-Hwan et. al.  
"Biodegradable microneedle"  
2005

J. controlled release, vol.104, pp. 51-66

18 yrs



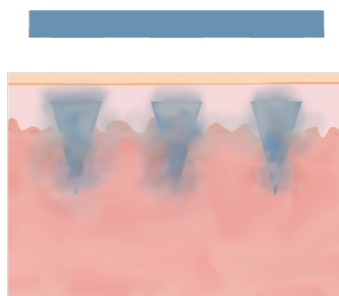
Still not being  
adopted in medicine  
2023

After 47 years since its inception, there is still no pharmaceutical application.



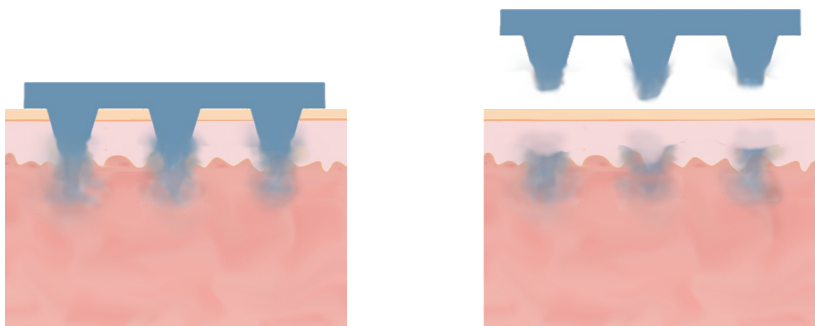
# Critical Pain Points of dissolving microneedles

## Ideal



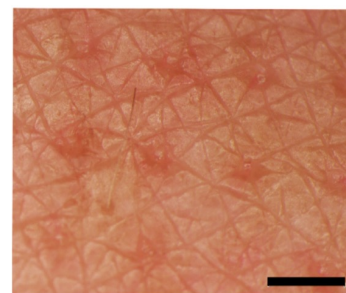
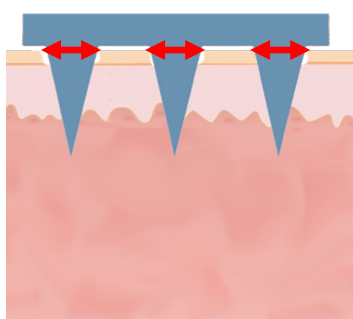
Complete penetration and dissolution of needles in skin tissue with no skin irritation side effect.

## Reality



Incomplete delivery due to incomplete penetration or incomplete dissolution or the bouncing back during the long application of the microneedles.

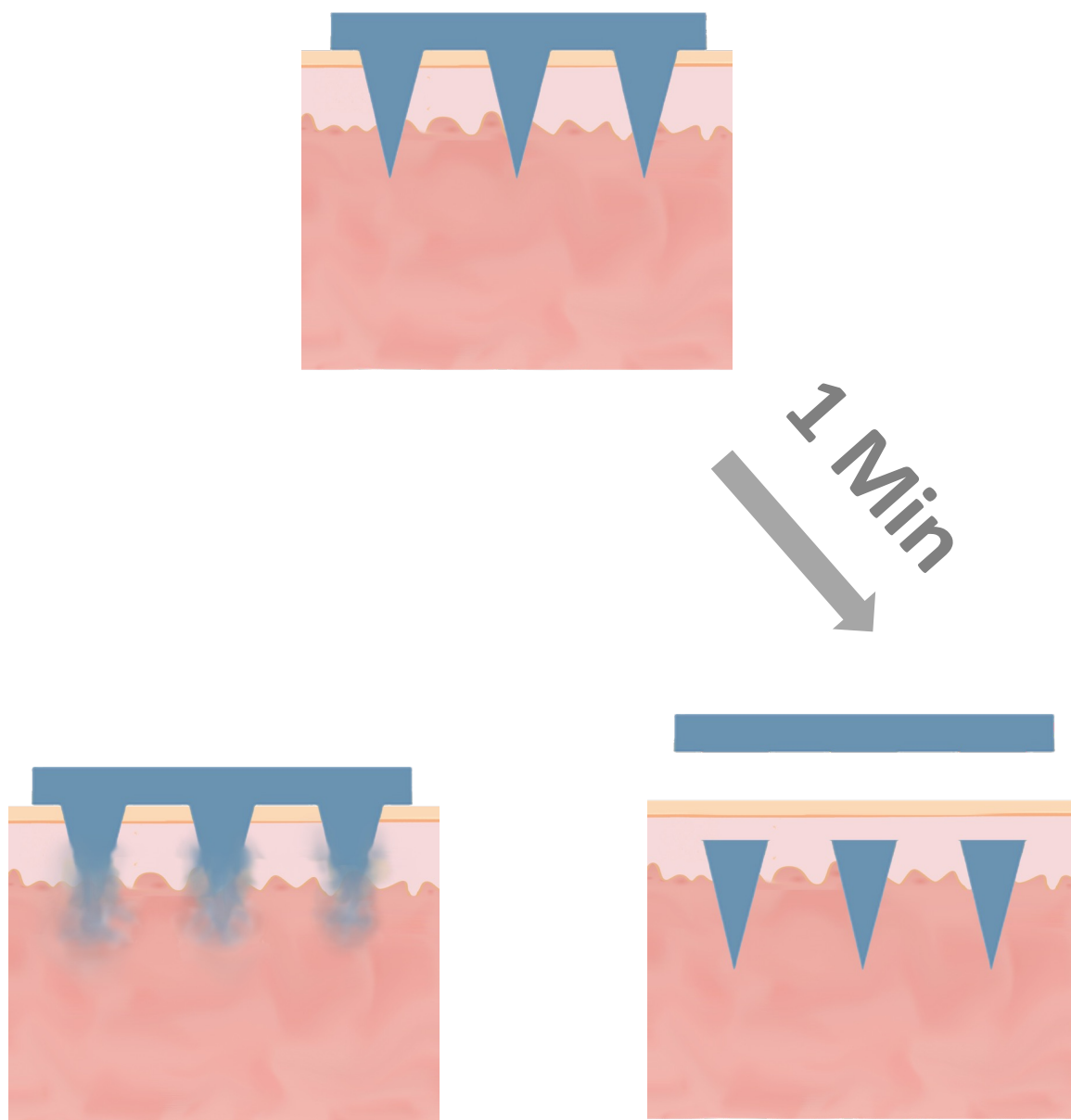
## Reality



Reality: Skin abrasion due to long opening of skin channels during the long application of microneedles.



## Detaching Technology has solved the pain points.

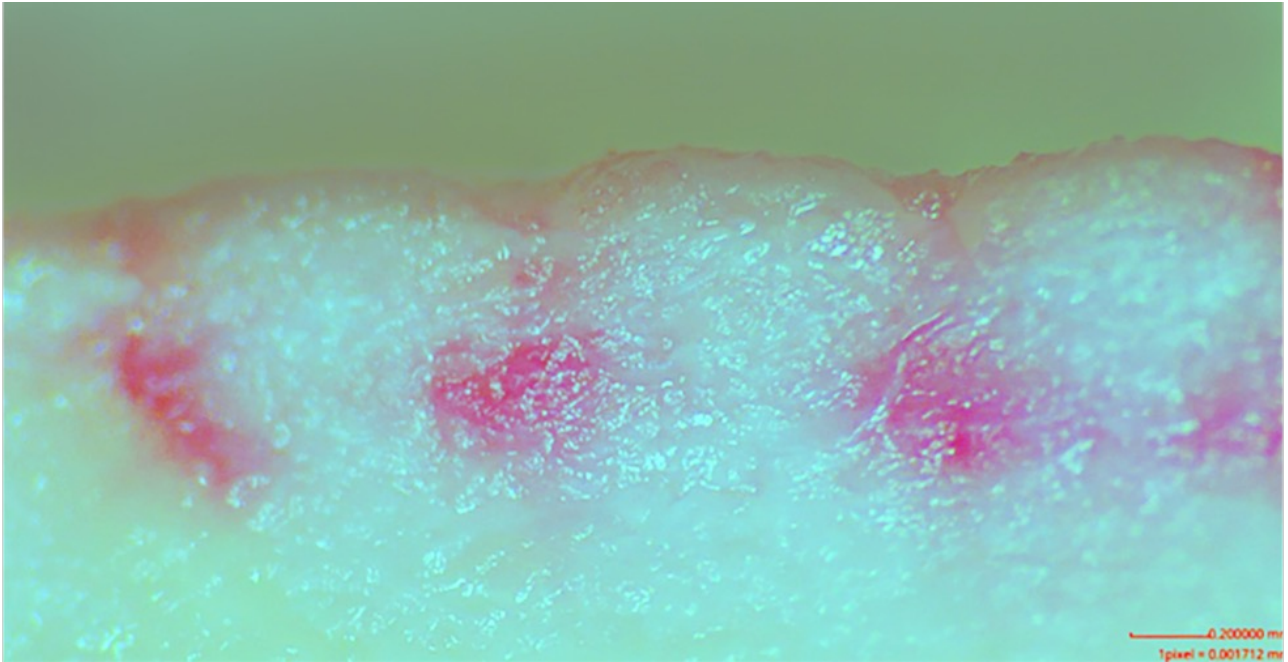


Rather than relying on the dissolution of microneedles in the skin to deliver cargo, our delivery mechanism consists of the imbedding of cargo-loaded microneedles into the skin and their immediate detachment from their base. This allows the administration of Mineed's microneedles to be completed in 30 seconds without leaving a patch behind.



## Proofs

### Visual evidence



The detaching technology provides a delivery efficiency of over 90 percents, regardless of the payload percentage and water solubility of the bioactives in the needles.

Nanomaterials 10, 368, 2020

ACS Applied Bio Materials 3, 4581, 2020    Scientific Reports 11, 24114, 2021

Drug Delivery & Translational Research 12, 2751, 2022

Clin Cosmet Investig Dermatol in press





## Applications

### Cosmetics

Small molecules  
Biologics

Mineed investigates, develops, and manufactures a variety of cosmetic products utilizing its detachable microneedle technology. We operate as a contract manufacturer for cosmetic brands.

### Tattoo

Permanent  
Semi-permanent

For tattoos, Mineed investigates, designs, and conducts safety and pattern-longevity tests in addition to manufacturing self-applicable semipermanent and permanent tattoos.

### Pharmaceuticals

- Drugs
  - Topical/Systemic
- Vaccine
  - Subunit/mRNA
  - Live attenuated
- Diagnostics

For the pharmaceutical industry, Mineed focuses on collaborative research and development of various medical applications employing detachable microneedle technology for the intradermal or transdermal delivery of selected active pharmaceutical ingredients. Local and systemic medications, vaccines, and diagnostics are examples of applications.



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