# THE BENEFITS OF OLIGOMERIC SWITCH ADHESIVES IN **ADVANCING WOUND CARE**

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## PURPOSE

To develop medical pressure-sensitive adhesives that possess high peel force when in contact with the skin and low peel force when removed from the skin to advance a better continuum of advanced wound care and research.

## METHODS

The means by which the peel force of a skin adhesive has been modulated in the past has included physical approaches (peel angle, deformation of skin, substrate material, etc.) and chemical processes that implement a "switch" that can be activated during removal to significantly reduce the peel force of the adhesive. Herein, we report the application of oligoglycerol sebacate (OGS) as an adhesive "switch" that is activated via the contact with 50-91% isopropyl alcohol (IPA) to promote a rapid decrease in peel force during removal of a medical pressure-sensitive adhesive ("PSA"). Glycerol and sebacate were combine under a polycondensation reaction to form OGS. OGS was blended into a solvent based PSA in varying ratios and coated onto various films, including a nonwoven bandage and a polypropylene tape material. There was a 94% drop in peel force with the application of IPA.

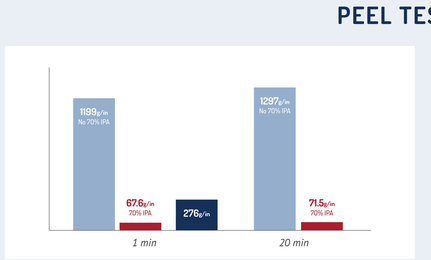



## RESULTS

The decrease in peel force is approximately 94%, and occurs on a clinically manageable time-scale (3-10 seconds) as proven by time-dependent and concentration-dependent studies using analysis of variance (ANOVA). Statistical differences were also considered significant when $p<0.05$. The sample size of each group was N=10. Additionally, the bandages, tapes and dressings possess very high moisture vapor transmission rates (MVTR ). This MVTR of the transparent dressings was shown to be greater than 6200g/m$^2$ at 24 hours.

### COMPARING NONWOVEN, POLYPROPYLENE & POLYURETHANE MATERIALS

#### PEEL TEST RESULTS

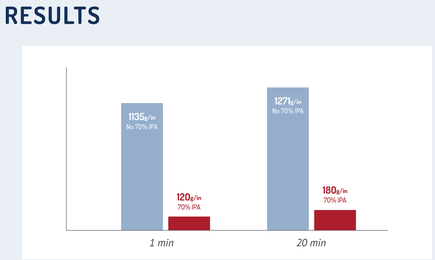



**NONWOVEN FILM**
*Peel Data off Stainless Steel, unbacked*

| DWELL TIME | NO 70% IPA | 70% IPA |
|---|---|---|
| 1 min | 1199 g/in | 67.6 g/in |
| 20 min | 1297 g/in | 71.5 g/in |

**POLYURETHANE**
*Peel Data off Stainless Steel, unbacked*

| DWELL TIME | NO 70% IPA |
|---|---|
| 1 min | 276 g/in |

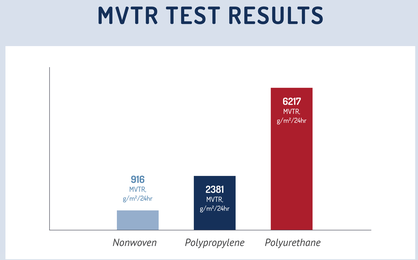



**POLYPROPYLENE**
*Peel Data off Stainless Steel, unbacked*

| DWELL TIME | NO 70% IPA | 70% IPA |
|---|---|---|
| 1 min | 1135 g/in | 120 g/in |
| 20 min | 1271 g/in | 180 g/in |

**TEST PROCEDURE**
- *Samples were cut into 1" wide strips and applied to stainless steel plates with a 4lb. roller.*
- *After the appropriate dwell time, the samples were peeled off the plates at 180°, at a rate of 12in/min.*
- *Samples that were tested with alcohol, were wetted with a cotton ball with 70% IPA in water, and allowed to sit for 3-5 seconds before peeling.*

#### MVTR TEST RESULTS




**MVTR NONWOVEN, POLYPROPYLENE & POLYURETHANE**

| SAMPLE | MVTR, G/M²/24HR |
|---|---|
| Nonwoven | 916 |
| Polypropylene | 2381 |
| Polyurethane | 6217 |

**OBSERVATIONS**
- *Samples were unbacked, and during the peel testing, the elastic PU nonwoven stretched quite a bit, and doing so left adhesive residue on the panels. This just occurred with samples that no alcohol was applied to.*
- *Samples that were wetted with 70% IPA did not stretch as much due to the lower peel adhesion, and **LEFT NO RESIDUE** on the panels.*
- *Samples of polypropylene did not stretch with the high peel adhesion and **LEFT NO RESIDUE** on the panels.*

## CONCLUSIONS

The technology found within this research is amenable to current manufacturing processes and is ready to be implemented in medical pressure-sensitive adhesives so that healthcare providers, patients, and consumers might have a simple and inexpensive means of diminishing pain and skin trauma during the removal of medical bandages, tapes and dressings. The technology is now available in First Aid and Acute Wound Care bandages and tapes, and will also be available in Advanced Wound Care dressings in Q1 2019.