

# Control of Cytotoxicity Level of Tacky-free Polyurethane Pressure-sensitive Adhesives for Minimal Health and Safety Issues

Ju-Won Kim, Min-Ji Seo, Won-Bin Lim, Jin-Gyu Min, Ji-Hong Bae and PilHo Huh\*

Department of Polymer Science and Engineering, Pusan National University, Busan 46241, South Korea

\* pilho.huh@pusan.ac.kr

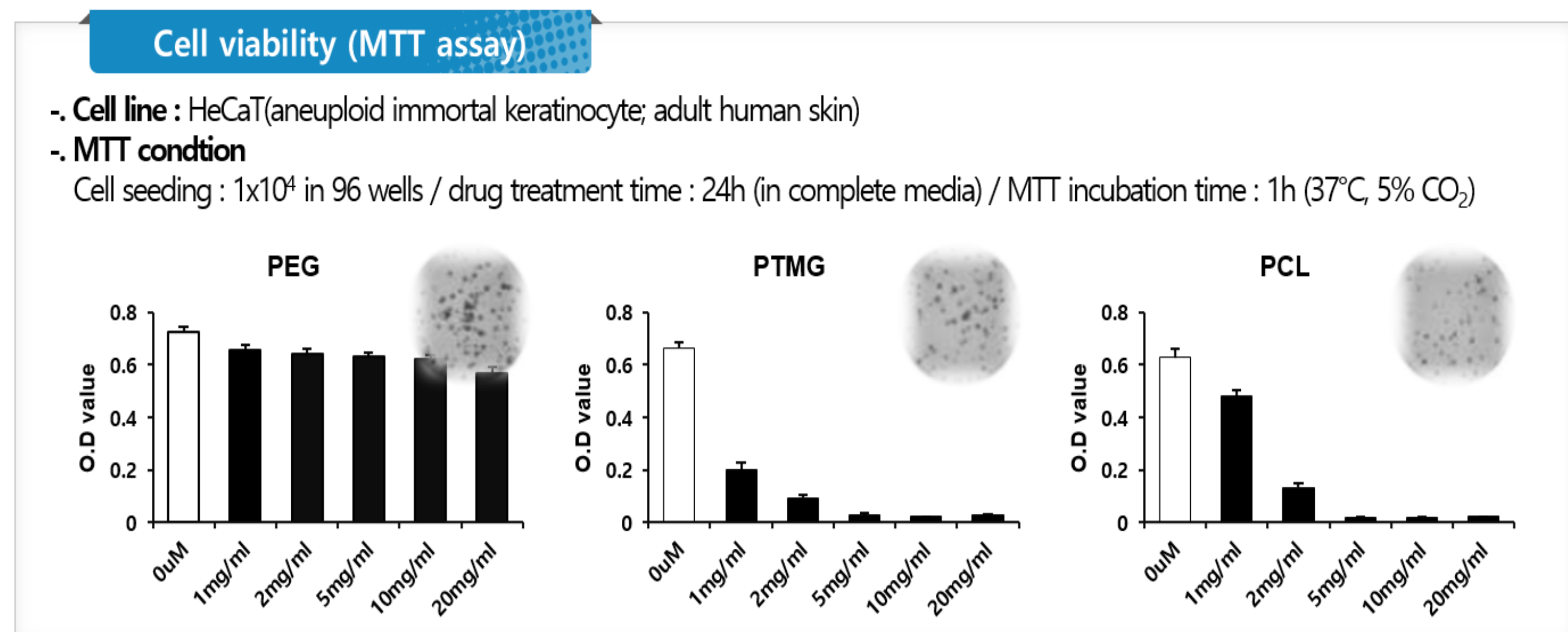
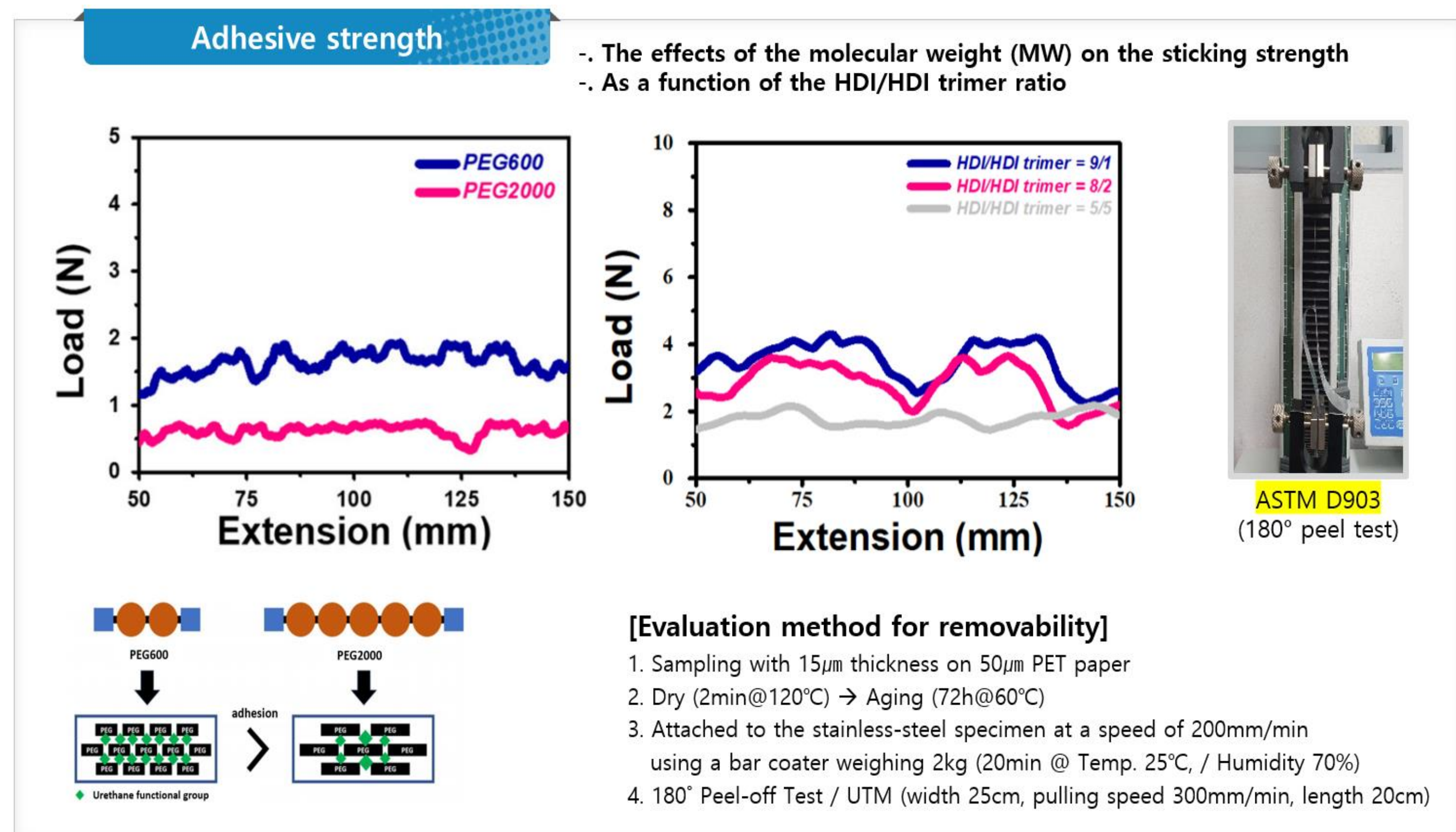
## Abstract

Polyurethane pressure-sensitive adhesives (PU-PSAs) with satisfactory tack, cohesion, and removability were newly developed through the synthetic process by reacting methylene diisocyanate, poly(ethylene glycol) (PEG), and a 1,4-butanediol chain extender based on the different HDI/HDI trimer ratios. The sticking properties of PU-PSAs depended on both the HDI/HDI trimer ratio and crosslinking-agent composition in the formulation. The differences in the crosslinking-density significantly affected the cohesion, adhesion, and tack in PU-PSA. The formulation of 50 wt% 600PEG and 50 wt% crosslinking-agent and an HDI/HDI trimer ratio of 1.0 led to the optimal balance between the adhesion and cohesion properties owing to the sufficient tack, high 180-peel strength, and good cohesion. PU-PSAs formulation with cell viabilities over 90% in a cytotoxicity test could be considered as a novel non-cytotoxic excellent candidate material for as a completely removable PSA in labels and medical patches.

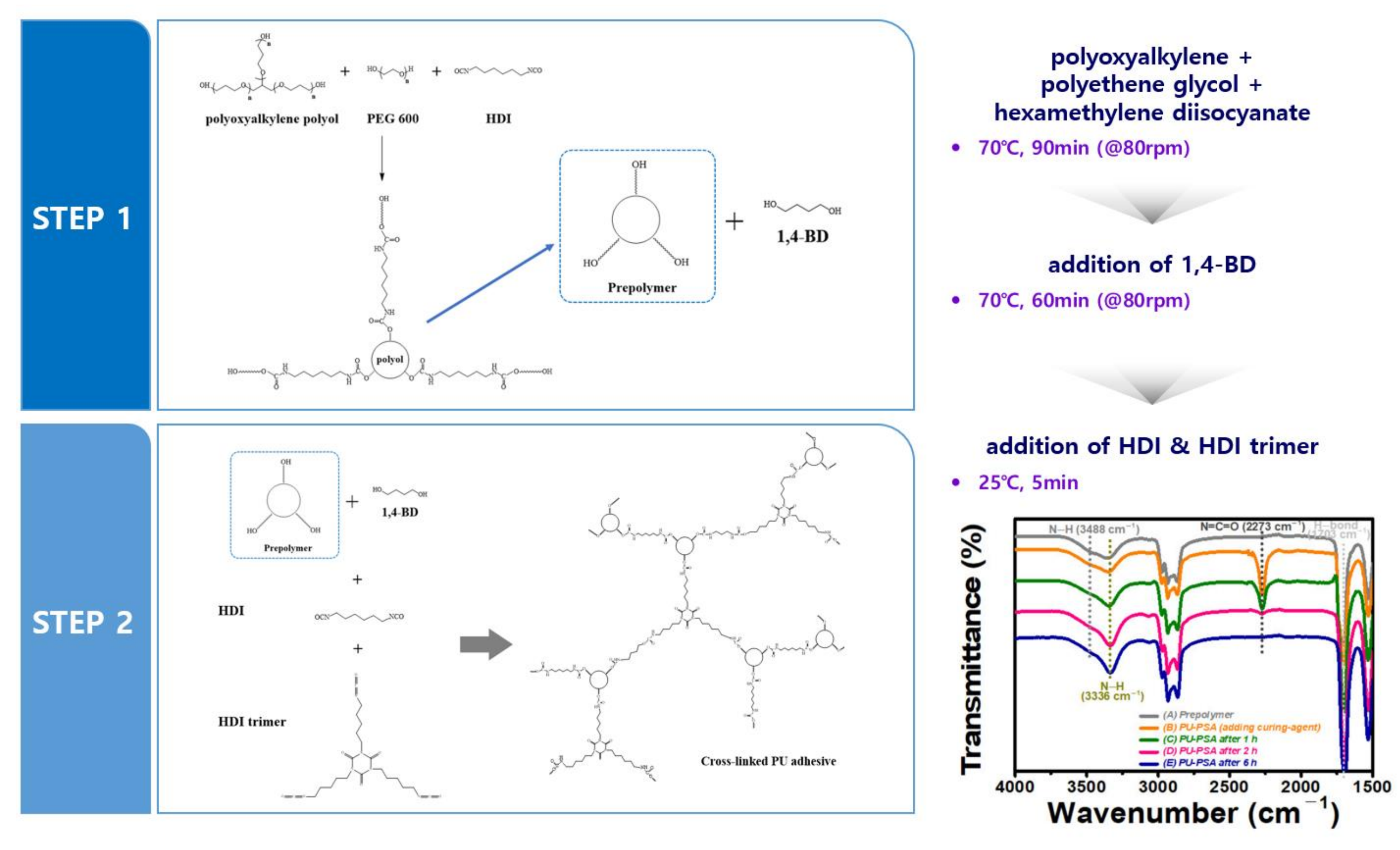
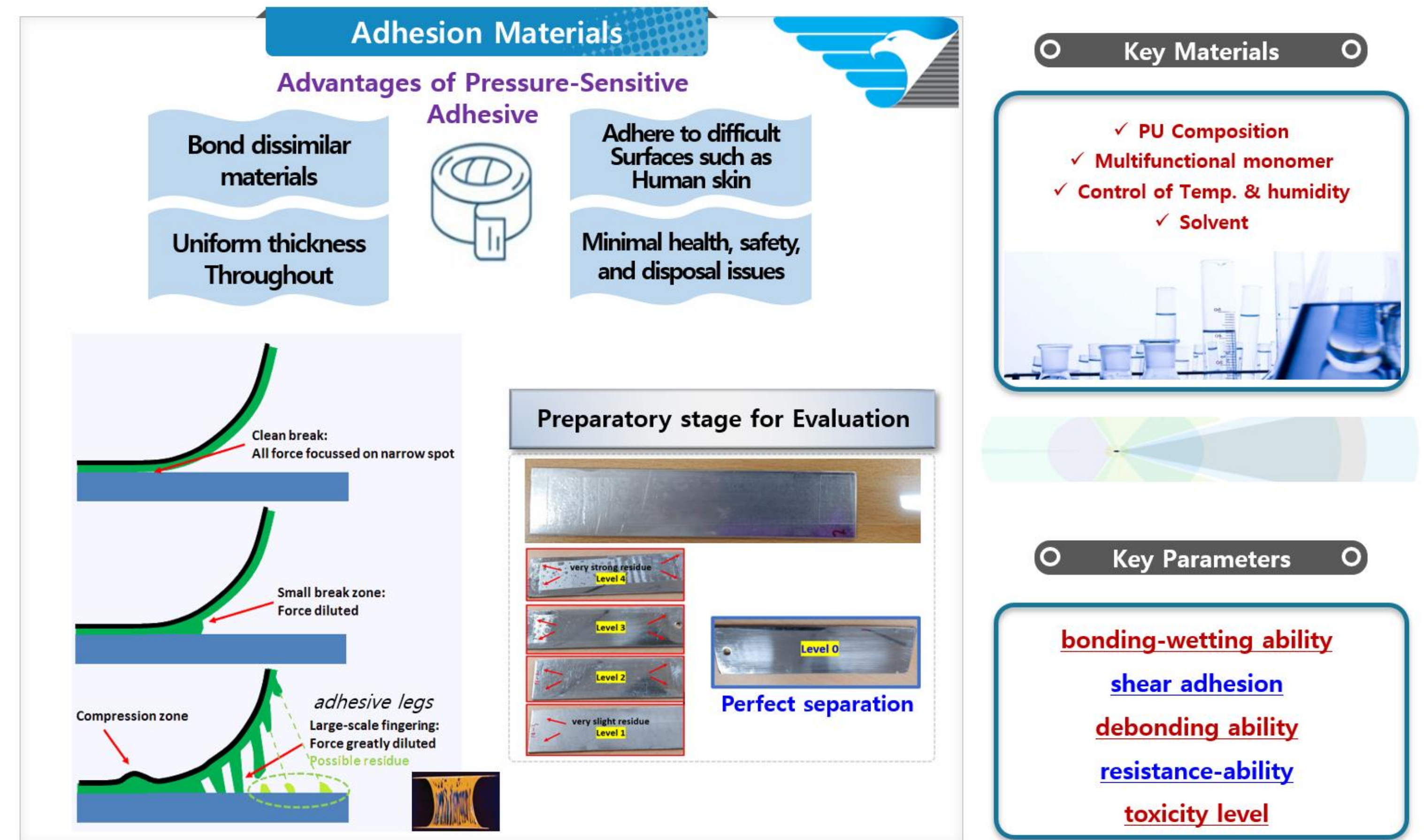
## Objective

1. Synthesis of PU-PSA without transcriptional area
2. Adjust adhesion strength and control of cytotoxicity level
3. Estimate success of synthesis and performance of PU-PSA

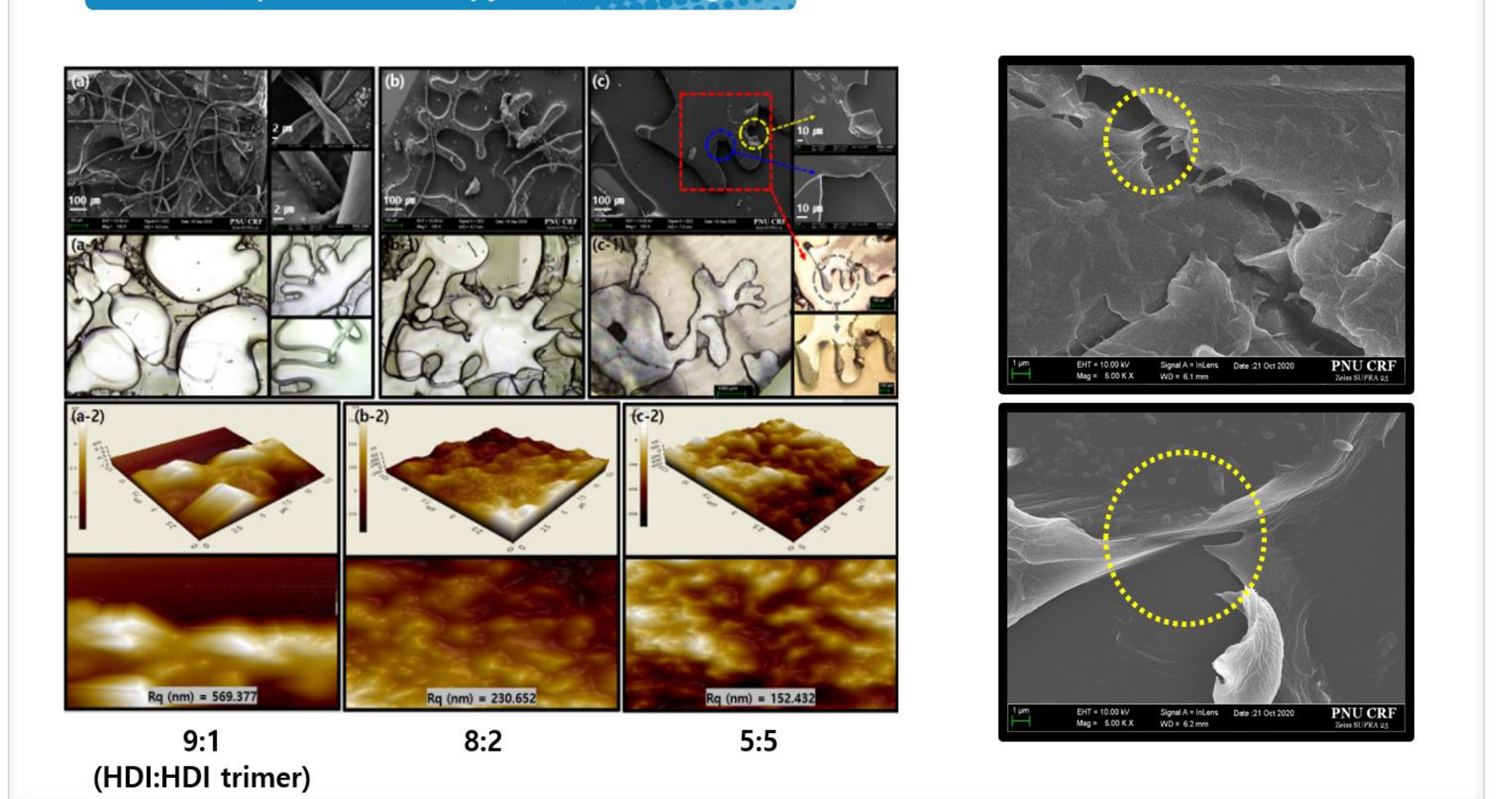
## Results



## Experimental



## FE-SEM, optical microscopy and AFM images



## Conclusion

- ▶ A novel PU-PSA based on polyurethane to determine the optimal bonding strength.
- ▶ As the molecular weight of the polyol decreased, the crosslinking density increased, and the adhesive strength increased accordingly.
- ▶ As the content of HDI Trimer in the crosslinking agent increased, the transcriptional property improved.
- ▶ Treatment with PTMG and PCL induced concentration-dependent cytotoxicity whereas PEG has been shown to be safe.

## Acknowledgement

- ▶ This study was supported by Korea Agency for Infrastructure Technology Advancement (Grant No. 22POQW-B152739-04)