



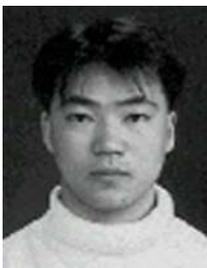
1. PU 가 가  
 ( PU) polyol , 가 , 가  
 diisocyanate , 가 .  
 diol diamine (chain ex - PU 가 가  
 tender) (ure - 2000  
 thane group, urea group) segment 9 10  
 . PU fiber, .<sup>1,2</sup> PU stress - strain PU  
 elastomer ENPLA .<sup>3,4</sup> 1



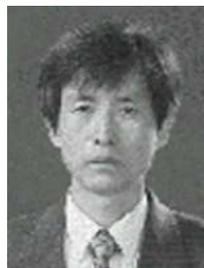
1993 ( )  
 1995 ( )  
 1998  
 2000



1973 ( )  
 1981 Ohio ( )  
 1984 Virginia Polytechnic Inst. &  
 State Univ. ( )  
 1978  
 1988  
 1988



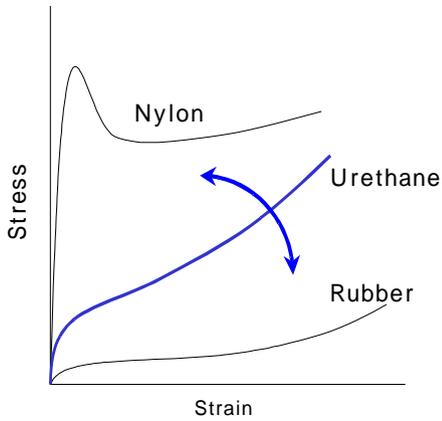
2001 ( )  
 2001



1975 ( )  
 1978 ( )  
 1987 ( )  
 1978  
 1980  
 1980

**Functional Polyurethanes**

(Jong Cheol Lee, Jong Hee Kim, and Byung Kyu Kim, Department of Polymer Science and Engineering, Pusan National University, Busan 609-735, Korea)  
 (Han Mo Jeong, Department of Chemistry, University of Ulsan, Ulsan 680-749, Korea)



1. PU stress-strain .

가 PU

가  
가가  
PU PU,

가 PU

2. PU

PU  
PU

가 . 1980  
가  
. 5

end user가

가  
가 . 3

PU 1970

1980

6-9  
PU ( )  
/ process 가 가 . 5,10 , PU

PU  
가 가  
PU

PU  
2.1 PU  
PU ion  
ionomer  
ionic group ( ion group)

tackiness  
6-8  
PU 가  
가 가  
(T<sub>g</sub>) , T<sub>g</sub> PU  
가

PU /  
가  
PU  
graft  
PU 가

3 가  
PU acrylate graft  
poly(propylene) glycol

PU UV PU acrylate

NCO prepolymer 2-hydroxyethyl acrylate (HEA) PU acrylate prepolymer 가  
PU acrylate

PU acrylate reactive diluent

11,12

PU acrylate prepolymer (HVTP, hydrophilic vinyl terminated prepolymer) acrylic

acryl PU acrylate prepolymer

PU prepolymer 가

가 PU PU acrylate

micelle 가 ABCP (AB crosslinked polymer) latex

13,14

PU latex interpenetrating polymer network (LIPN) LIPN

HVTP vinyl 가

가 PU 가 full IPN, semi IPN 가 acrylate 가 ABCP

ABCP가 LIPN 가 LIPN

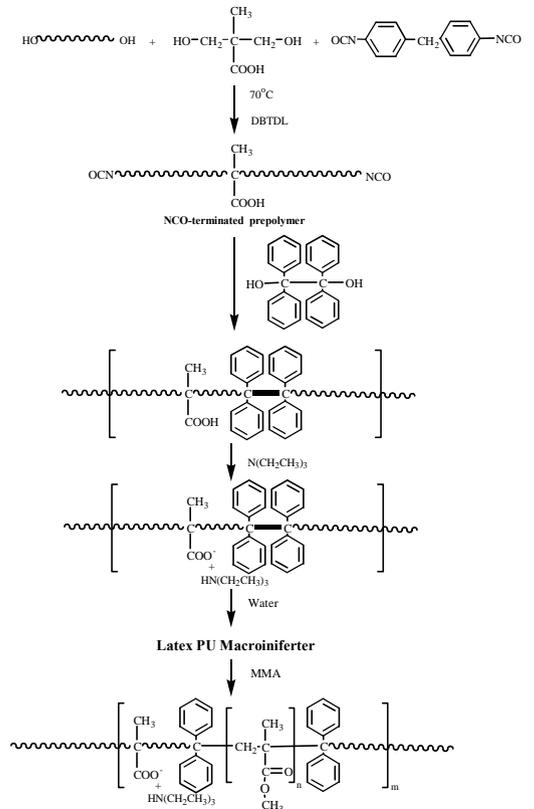
ABCP

가 , 15 IPN

가 , 15-20 PU

IPN latex core-shell inverted core-shell

가 , interfacial tension



2. Macroiniferter PUMI/PMMA

가 21

Iniferter initiator, propagation chain transfer living

2 NCO PU prepolymer iniferter TPED(1,1,2,2-tetraphenylethane-1,2-diol) MMA가 TPED site 22,23

2.2 PU PU

pre-polymer mixing process가

process PU free

NCO PU 4,4'-diphenyl methane diisocyanate

(MDI), toluene diisocyanate (TDI) PU 가

isophorone

diisocyanate (IPDI), 1,6-hexamethylene diisocyanate (HDI) <sup>5</sup> IPDI, <sup>24</sup> clay 가

HDI diisocyanate , clay

PU

NCO PU prepolymer blocking agent ( , , ),

PU prepolymer ( , , ) gas bar-  
rier <sup>25</sup>

capped pre-polymer deblocking 가 , clay 가 가 (400 - 800 nm) 가

PU 가 PU clay

MDI base PU prepolymer hydroxy group emulsion <sup>26-28</sup> polystyrene SAN 가

epoxy group 가 <sup>29-31</sup>

glycidol prepolymer mixing process 가 emul-  
sion PU 가

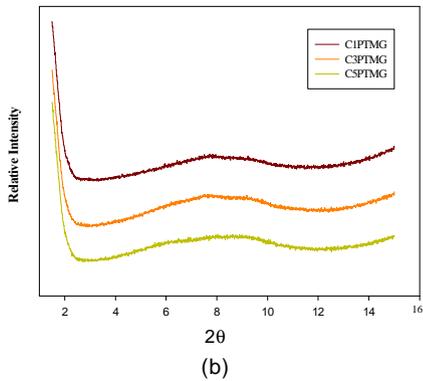
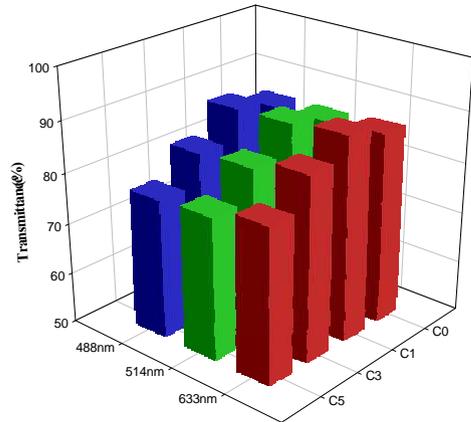
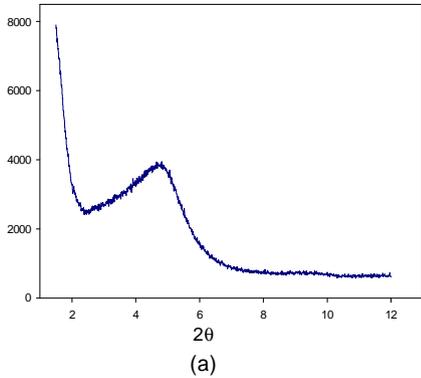
PU prepolymer ABCP PU 가 clay montmorillonitrile 가 clay mixing

3. Clay PU diisocyanate DMPA(dimethylol propionic acid) prepolymer clay 가 TEA(triethyl amine) PU clay

PU XRD , clay

( 3(a)) clay 4 가 PU clay가 ( 3 (b)) clay 가 가 clay PU 가 clay가 swell ,

가 가 . clay가 가



4. PU/clay

#### 4. Silylated PU

3. clay(a) PU/clay(b) XRD

40 nm clay 가  
 130 nm clay 가  
 clay 가  
 clay가 PU

DMTA 가

UV - Visible R(red), G(green), B(blue) ( 4), clay 가

clay 가 clay swell , clay 가

PU PU 가

silane NCO PU prepolymer capping agent  
 , silane sealant isocyanate group system  
 . silane silane capping silylated PU silane  
 PU 가 , alkoxy silane 가 가  
 siloxane (Si - O - Si) 3 network  
 .<sup>32</sup> Silylated PU 가 가 hybrid

가 silylated PU 가

tailor - made 가 가 Silane 가 NCO PU prepolymer , silicone silylated PU

가 가 , dialkoxy silane trialkoxy type 가 가 modulus 가 가 .<sup>33</sup> Silylated PU

UV , ,

Hybrid silylated PU wet  
 chloride) (PVC), acrylonitrile butadiene styrene  
 (ABS) plastic 가  
 silylated PU sealant 3 network ,  
 siloxane (Si - O - Si) , 가



(a)



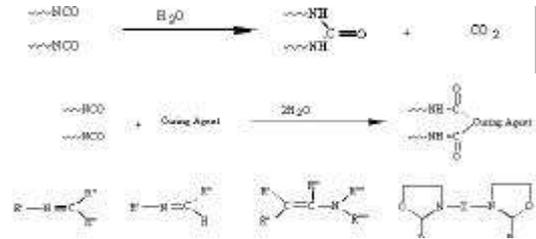
(b)

5. (a)

(b)

tank

가 35 silylated PU ,  
 PU



6. Diisocyanate 가

가

NCO

5.

(Watercurable PU)

5.1

PU 가 NCO가 ,  
 가

가

가

PU

5.2

5 (a)

가

가 가  
 20 - 90%  
 37

가  
 가

가

PU 가

PU

5 (b)

가 8 mm  
 가 PU

가

가

가 가

PU

NCO  
 6  
 CO<sub>2</sub>가

가

38-40

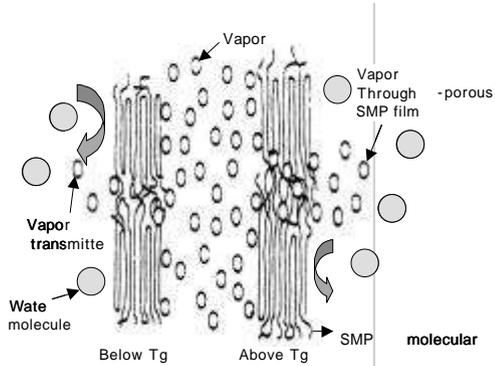
( 6 )  
 36

CO<sub>2</sub>  
 NCO

가

가





$$P_{H_2O} < P_{H_2O}$$

7.

7.

PU

, pH,

, 2

가

1984 CdF - Chimie Company (France) norborene, trans - polyisoprene, butadiene - styrene block copolymer, crosslinked polystyrene

<sup>46</sup>

PU  
PU  
(microporosity)

PU Heavy Industry Mitsubishi To - bushi

PU system

가 가

가 microchannel 가

PU ionomer,<sup>47</sup> mesogenic group<sup>48</sup>  
PU<sup>49</sup>

crochannel 가

가 mi -

microchannel

2가

가 . 가

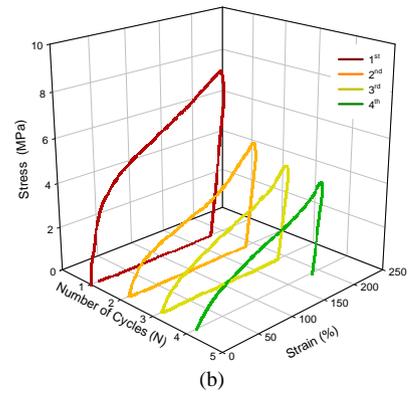
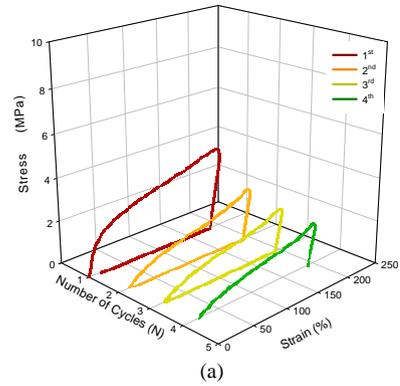
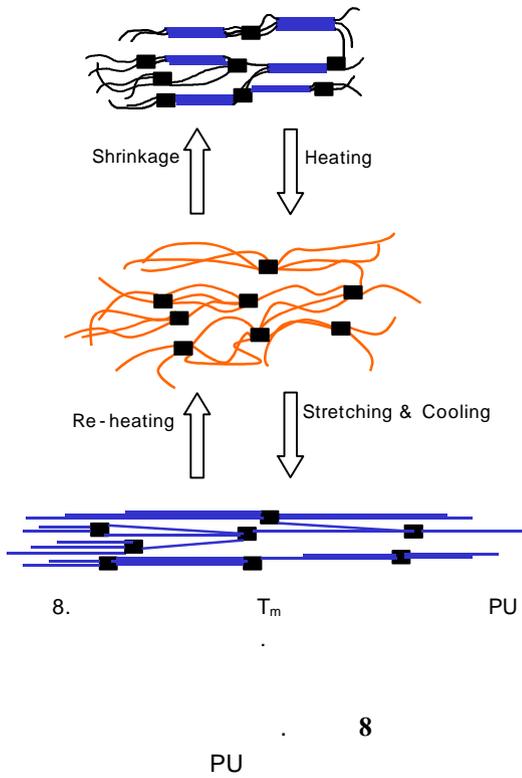
PU 가

가

2

PU

가



PU 27가  
PU  
가 , raw material

9. PU-urea (a) PU-urea (b)

PU  
PU  
PU  
PU-urea  
silicate type clay montmorillonite  
12-aminolauric acid  
prepolymer solution mixing,  
50  
9 PU-urea PU-urea  
clay

8.  
가  
PU  
가가  
PU  
가  
PU  
가  
PU

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