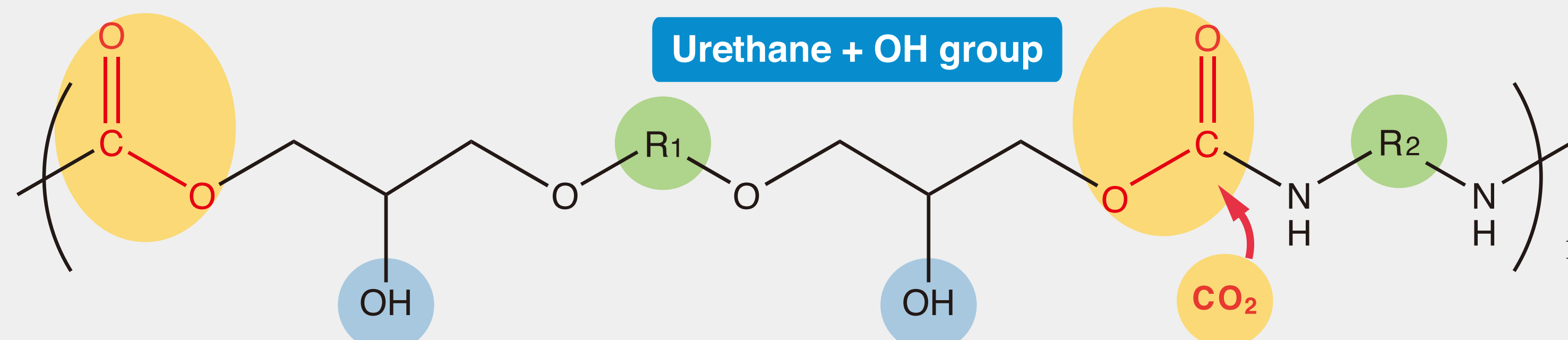


Hydroxy polyurethane resin synthesized from carbon dioxide as a raw material

Dainichiseika Color & Chemicals Mfg. Co., Ltd.

Introduction to Hydroxy polyurethane (HPU)

GSC Material



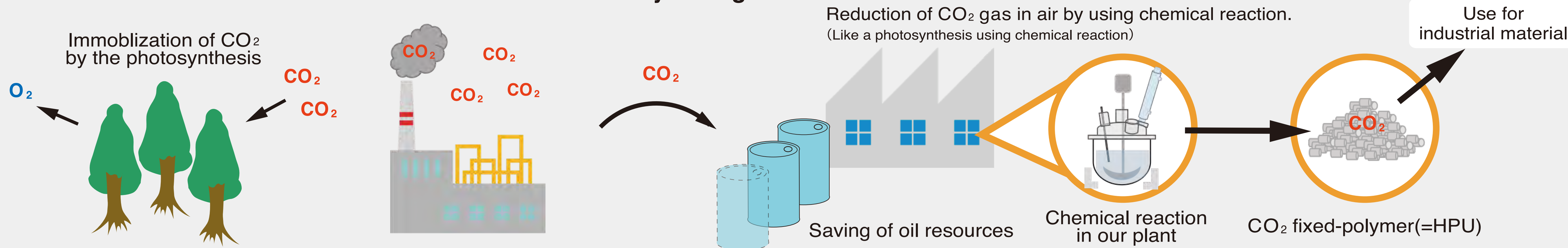
Various molecular structure

Features

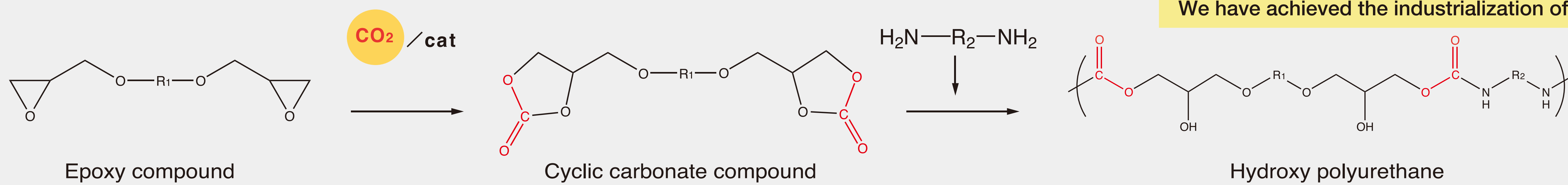
1. Green and Sustainable Chemistry materials (using gas phase CO₂)
2. Urethane bond and OH group (New functional resin)
3. Variety of physical and chemical properties

Creation of New plastic from CO₂

We will contribute to the realization of a low-carbon society through HPU



The industrialization of HPU



We have achieved the industrialization of this reaction

N. Kihara, T. Endo, *J. polym. Sci. part A*, 1993, **31**, 2765-2773.

Properties

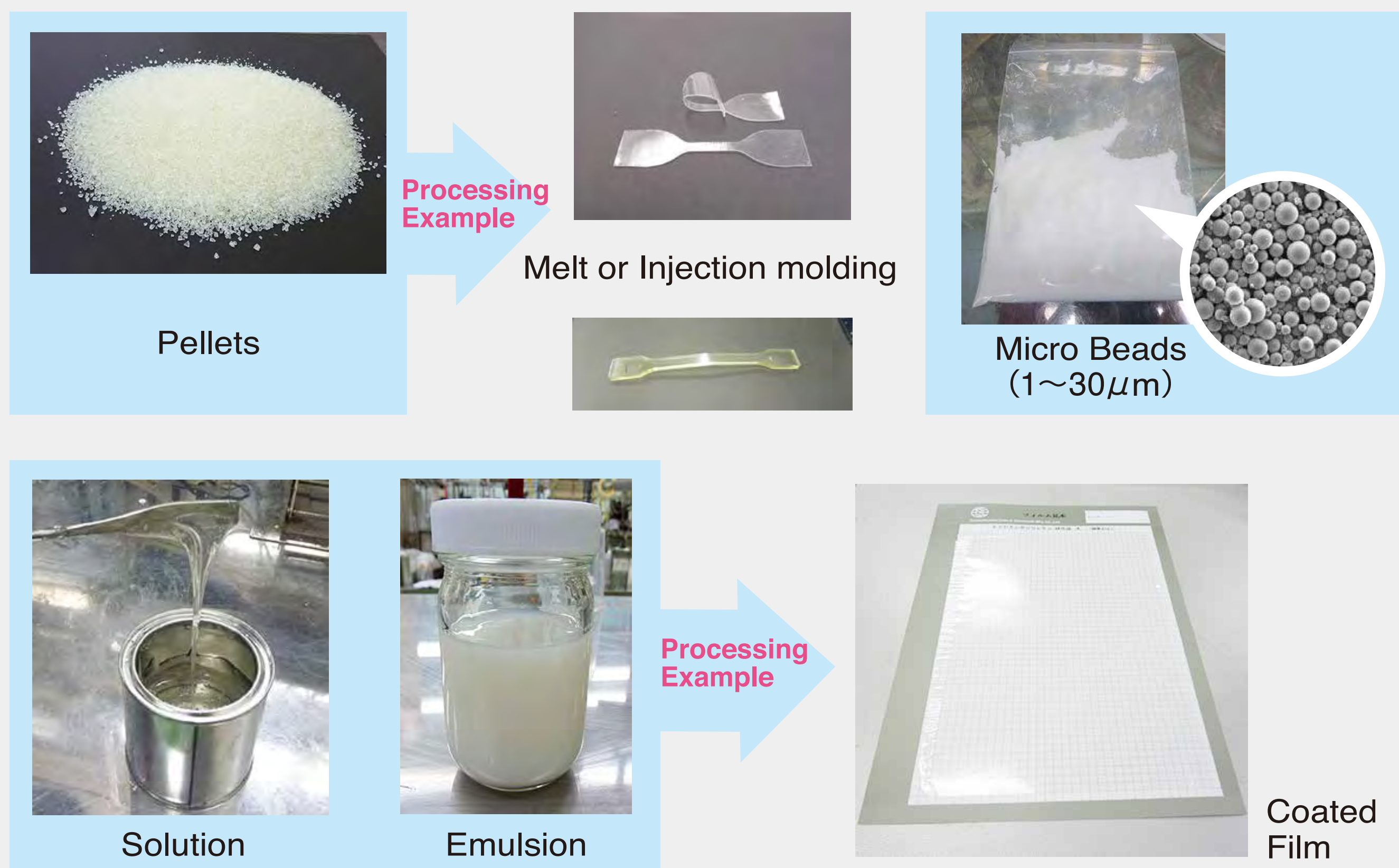
HPU has the character of urethane-bond and OH group

High strength / High adhesion / Solvent resistance / Gas barrier property / Adhesion to metals / Abrasion resistance(wear resistance)/ High Reactivity

Table :Characteristic test value of products

		Type A	Type B	Measurement method
Chemical Property	Hydroxyl value	206 mgKOH/g	178 mgKOH/g	calculated value
	CO ₂ content rate	approx. 16%	approx. 14%	calculated value
Physical property	Appearance	Pale yellow transparent	Pale yellow transparent	Visual observation
	Specific gravity	1.21	1.15	
	Refractive index	1.55	1.55	JIS K7142
	Thermal property	Glass-transition temp.	65°C	59 °C
	Melting point	120°C	108 °C	DSC
	Breaking elongation	60 MPa	50 MPa	JIS K7161
Mechanical property	Breaking strain	5%	60 %	JIS K7161
	Tensile elasticity	1500 MPa	1160 MPa	JIS K7161
	Bending strength	90 MPa	73 MPa	JIS K7171
	Surface hardness	R86	R75	JIS K7202
	Izod impact strength	2.5 KJ/m ²	2.3 KJ/m ²	JIS K711
Thermal character	Thermal conductivity	0.24 W/mK	0.25 W/mK	ISO 22007-2
Electric character	Surface electrical resistance(RH50%)	E25 Ωcm	E15 Ω/cm	JIS K6911
	Dielectric constant	3.38	3.30	ASTM D 150-11(10 ⁶ Hz)
Other property	Oxygen transmission rate (65%RH)	20 cc 20μm/(m ² ·24hrs/atm)	160 cc	JIS K7126-2 (65% RH)

Product forms and applications



Assumed Applications

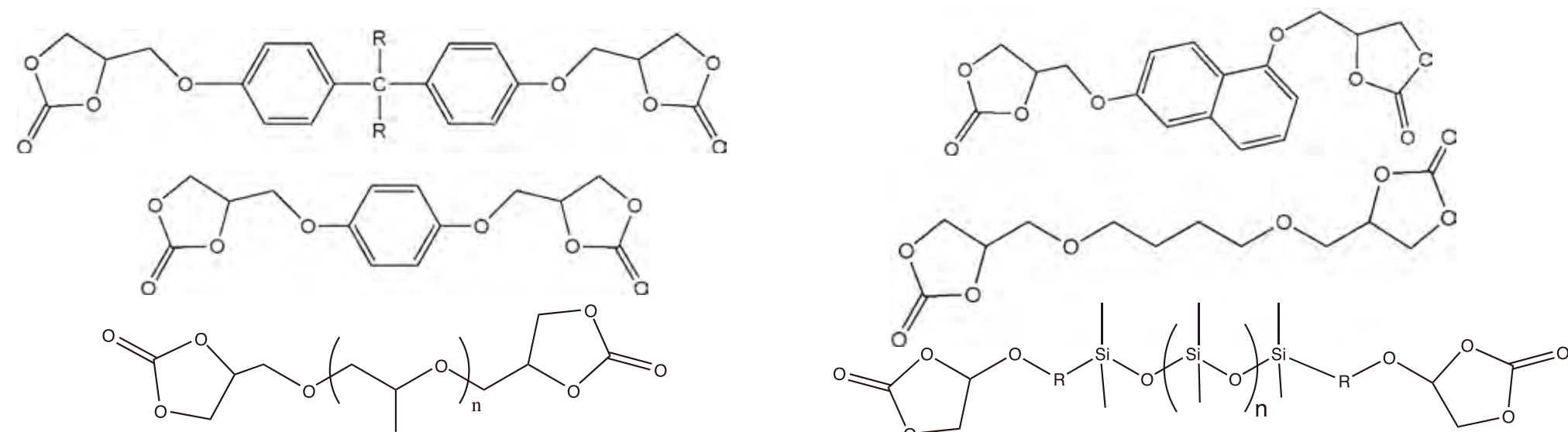
- Molding field ... Film, Fiber, Various products
- Coating field ... Barrier Coating, Heat-resisting coating, Anchor coat agent, Adhesive
- Ink field ... Various ink binder
- Epoxy field ... Resist ink, Sealing material

Various molecular structure

Molecular design of HPU can be controlled easily.

Control of structure, R1 and R2

Copolymerization of various cyclic carbonate compounds and amine compounds



Chemical modification of the hydroxyl group and Introduction of Various Functional groups

Various curing reaction can be applied (UV curing, Epoxy curing, Carbodiimide curing, Moisture curing, etc.)

