

ODA LABORATORY (July 1942~)

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The studies which have been carried out during these fifteen years in our laboratory are related to fundamental and applied researches on polymer syntheses. Several problems in polymerizations of vinyl compounds, aldehydes, cyclic ethers, and olefins—especially, on reactivities of monomers and behaviors of catalysts have been dissolved by Drs. Furukawa, Tsuruta, Onishi, Saegusa and Yamamoto. Some new monomers and polymers have been successfully prepared by Drs. Okano and Tanimoto. In addition, studies to develop ionic addition reactions related to polyadditions have been made by Dr. Okano.

Publications

(* indicates an article published in Japanese)

I. Kinetics and Mechanisms

1. R. Oda, M. Miyanoki and M. Okano; Kinetics of the pyrolytic Decarboxylation of 2-Oxazolidinones, *Bull. Cnem. Soc., Japan*, **35**, 1915 (1962).
2. Y. Ito, M. Okano and R. Oda; The Mechanism of the Reaction of P-Ylides with Dichlorocarbene, *Tetrahedron*, **22**, 2615 (1966).

II. New Organic Reactions

1. M. Okano, T. Hamada, Y. Ito and R. Oda; Addition of Epoxides to Isocyanide Dichlorides, *Bull. Inst. Chem. Res., Kyoto Univ.*, **44**, 227 (1966).
2. R. Oda, S. Takashima and M. Okano; Dimerization of Diketene, *Bull. Chem. Soc., Japan*, **36**, 476 (1963).
3. R. Oda, S. Takashima and M. Okano; Addition of Schiff Bases to Diketene, *Bull. Chem. Soc., Japan*, **35**, 1843 (1962).
4. R. Oda, M. Okano, S. Tokiura and F. Misumi; Addition of Aliphatic Epoxides to Nitriles, *Bull. Chem. Soc., Japan*, **35**, 1219 (1962).
5. R. Oda, M. Okano, S. Tokiura and A. Miyasu; Addition of Aliphatic Epoxides to Schiff Bases, *Bull. Chem. Soc., Japan*, **35**, 1216 (1962).
6. R. Oda, S. Munemiya and M. Okano; Reaction of Epoxides with Ketene, *J. Org. Chem.*, **26**, 1341 (1961).
7. M. Okano, S. Katsurakawa, Y. Ito and R. Oda; The Effects of Inorganic Chlorides on the Amide Chloride—Epoxide Reaction, *J. Chem. Soc., Japan, Pure Chem. Sect.*, **87**, 108 (1966).*
8. Y. Ito, M. Okano and R. Oda; The Addition of N,N-Dialkylamide Chlorides to Isocyanides, *Tetrahedron*, **22**, 447 (1966).
9. Y. Ito, S. Katsurakawa, M. Okano and R. Oda; Reaction of Amide Chlorides with Cyclic Ethers, *Tetrahedron Letters*, 1321 (1965).
10. M. Okano, Y. Ito and R. Oda; The Reaction of Ylides with Halocarbenes, *Bull. Inst. Chem. Res., Kyoto Univ.*, **42**, 217 (1964).
11. M. Okano, Y. Ito, T. Shono and R. Oda; The Formation of Urethanes and Ureas from Isocyanides, *Bull. Chem. Soc., Japan*, **36**, 1314 (1963).
12. A. Oku, M. Okano, T. Shono and R. Oda; Homolytic Ring-Opening of Glycidates by Acetonyl Radicals, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **68**, 821 (1965).*
13. Y. Ishikawa, M. Okano and R. Oda; The Reaction of Alkyl Phenyl Ketones with Nitrosyl-

- sulfuric Acid, *J. Chem. Soc. Japan, Ind. Chem. Sect.*, **66**, 1314 (1963).*
14. R. Oda, M. Miyanoki and M. Okano: Products of the Pyrolysis of Some 2-Oxazolidinones, *Bull. Chem. Soc., Japan*, **35**, 1910 (1962).
 15. R. Oda, M. Miyanoki and M. Okano: A Convenient Synthesis of 3-Substituted 2-Oxazolidinones, *Bull. Chem. Soc., Japan*, **35**, 1309 (1962).
 16. T. Kawabata, S. Tanimoto and R. Oda: Research upon the Oxidation of Aromatic Primary Amines by Oxygen, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **67**, 1151 (1964).*
 17. S. Tanimoto, Y. Murao and R. Oda: Reaction of Unsaturated Carbonyl-Compounds with Thiourea, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **66**, 48 (1963).*
 18. R. Oda, T. Kawabata und S. Tanimoto: Entstehung von P-Ylid aus Triphenylphosphin und Acrylsäurederivaten, *Tetrahedron Letters*, 1653 (1964).

III. Polymer Syntheses

1. J. Furukawa, T. Tsuruta, T. Fueno, R. Sakata and K. Ito: Catalytic Reactivity of Organometallic Compounds for Olefin Polymerization. (I) (Diethylcadmium and Other Related Compounds), *Makromol. Chem.*, **30**, 109 (1959).
2. J. Furukawa, T. Tsuruta, T. Imada and H. Fukurani: Catalytic Reactivity of Organometallic Compounds for Olefin Polymerization. (III) (Vinyl Polymn. by Organoboron Compounds), *Makromol. Chem.*, **31**, 122 (1959).
3. J. Furukawa, T. Tsuruta, T. Saegusa, R. Sakata and A. Kawasaki: Polymerization of Propylene Oxide by Diethylzinc in the Presence of Cocatalysts, *Makromol. Chem.*, **32**, 90 (1959).
4. J. Furukawa, T. Tsuruta, T. Saegusa, H. Fujii, A. Kawasaki and T. Tatano: A New Method of High Polymerization of Acetaldehyde, *Makromol. Chem.*, **33**, 32 (1959).
5. J. Furukawa, T. Tsuruta, T. Saegusa and G. Kakogawa: New Catalyst for the Polymerization of Alkylene Oxides, *Makromol. Chem.*, **36**, 25 (1959).
6. J. Furukawa, T. Tsuruta and S. Inoue: Metal Ketyl as Initiator for Vinyl Polymerization, *Makromol. Chem.*, **36**, 77 (1959).
7. J. Furukawa, T. Saegusa, N. Mise and A. Kawasaki: Polymerization of Diketene, *Makromol. Chem.*, **38**, 243 (1960).
8. J. Furukawa, T. Tsuruta, T. Saegusa, S. Anzai, T. Narumiy a and A. Kawasaki: Polymerization of Olefins by the Binary Mixture of Organometallic Compound and Silica-Alumina-Titania, *Makromol. Chem.*, **41**, 17 (1960).
9. J. Furukawa, T. Tsuruta and T. Makimoto: The Stereospecific Polymerization of Butyl Acrylates with Strontium-Zinc Tetraethyl Complex, *Makromol. Chem.*, **42**, 165 (1960).
10. J. Furukawa, T. Tsuruta, Y. Nakayama and A. Kawasaki: Stereospecific Polymerization of Alkyl Thioacrylates. Part I, *Makromol. Chem.*, **43**, 76 (1961).
11. J. Furukawa, T. Saegusa and H. Fujii: Preparation of Crystalline Polyaldehydes, *Makromol. Chem.*, **44**, 398 (1961).
12. J. Furukawa, T. Tsuruta and N. Kawabata: Polymerization of Vinyl Ethyl Oxalate, *Makromol. Chem.*, **48**, 106 (1961).
13. J. Furukawa, T. Tsuruta and T. Makimoto: The Stereospecific Polymerization of Alkyl Acrylates by Organometallic Compounds, *Makromol. Chem.*, **50**, 116 (1961).
14. J. Furukawa: A Kinetic Interpretation of the Rheological Behavior of High Polymers, *J. Polymer Sci.*, **15**, 193 (1955).
15. J. Furukawa, T. Tsuruta and T. Fueno: Quaternary Anilinium Salt as an Initiator for Vinyl Polymerization, *J. Polymer Sci.*, **15**, 594 (1955).
16. J. Furukawa, T. Tsuruta, T. Saegusa, A. Onoshi, T. Fueno and A. Kawasaki: A New Catalyst for Stereospecific Polymerization of Diolefins, *J. Polymer Sci.*, **28**, 450 (1958).
17. J. Furukawa and T. Tsuruta: Catalytic Reactivity and Stereospecificity of Organometallic Compound in Olefin Polymerization, *J. Polymer Sci.*, **36**, 275 (1959).
18. J. Furukawa, T. Tsuruta and T. Fueno: Molecular Orbital Consideration on the Reactivities of Vinyl Compounds. (I) (Radical Reactivity), *J. Polymer Sci.*, **40**, 487 (1959).
19. J. Furukawa, T. Tsuruta and T. Fueno: Molecular Orbital Consideration on the Reactivities of Vinyl Compounds. (II) (Ionic Polymerizability), *J. Polymer Sci.*, **40**, 499 (1959).
20. J. Furukawa, T. Fueno, K. Asada and K. Morokuma: Molecular Orbital Consideration on the

- Reactivities of Vinyl Compounds. (III) (Polarographic Reduction), *J. Polymer Sci.*, **40**, 511 (1959).
21. J. Furukawa and T. Fueno: Probability Theory of Asymmetric Chain Growth in Polymerization, *J. Polymer Sci., Part A* **2**, 3681 (1964).
 22. R.A. Shelden, J. Furukawa and T. Fueno: Probabilistic Considerations of the Tacticity of Optically Active Polymers, *J. Polymer Sci., Part A* **3**, 1279 (1965).
 23. J. Furukawa, T. Tsuruta and N. Kawabata: Consideration on the Q-e Scheme. (I) (Reexamination on the Q-e Scheme), *Makromol. Chem.*, **51**, 70 (1962).
 24. J. Furukawa, T. Tsuruta and N. Kawabata: Consideration on the Q-e Scheme. (II) (Theoretical Approach to the Q-e Scheme), *Makromol. Chem.*, **51**, 80 (1962).
 25. J. Furukawa, T. Tsuruta, T. Saegusa, S. Ohta and G. Wasai: Crystalline Polymer of Acetone, *Makromol. Chem.*, **52**, 230 (1962).
 26. J. Furukawa, T. Tsuruta and T. Makimoto: Vinyl Polymerization with Organometallic Compound-Carbon Disulfide System, *Makromol. Chem.*, **52**, 239 (1962).
 27. J. Furukawa, T. Saegusa, H. Imai and S. Hirai: A New Catalytic System for the Polymerization of 3,3-Bis (chloromethyl)-oxacyclobutane, *Makromol. Chem.*, **53**, 203 (1962).
 28. J. Furukawa, T. Tsuruta and S. Inoue: Preparation of Optically Active Poly (propylene oxide) by Asymmetric Induction, *Makromol. Chem.*, **53**, 215 (1962).
 92. J. Furukawa, T. Saegusa and H. Imai: Some New Cocatalysts for the Polymerization of Four- and Five-Membered Cyclic Ethers by Lewis Acid Catalyst, *Makromol. Chem.*, **54**, 218 (1962).
 30. J. Furukawa, T. Tsuruta, S. Inoue and N. Yoshida: Resolution of DL-Propylene Oxide by Asymmetric Induced Polymerization, *Makromol. Chem.*, **55**, 230 (1962).
 31. J. Furukawa, T. Saegusa, H. Fujii and Y. Fujii: Polymerization of Acetaldehyde by Triethylaluminum/Water System, *Makromol. Chem.*, **55**, 232 (1962).
 32. J. Furukawa, T. Saegusa and H. Imai: Aluminum Alkyl Catalysts for the Polymerizations of Four- and Five-Membered Cyclic Ethers, *Makromol. Chem.*, **65**, 60 (1963).
 33. J. Furukawa, T. Fueno, T. Okuyama and Y. Takeda: Ionic Properties of the Triethylaluminum and Stannic Chloride System as Stereospecific Polymerization. Catalyst for Vinyl Isobutyl Ether, *Makromol. Chem.*, **76**, 299 (1964).
 34. J. Furukawa, T. Saegusa and T. Tsujino: Polymerization of Norbornene by Modified Ziegler Catalyst, *Makromol. Chem.*, **78**, 231 (1964).
 35. J. Furukawa, T. Saegusa and H. Imai: Acid Strength of Organometallic Compounds and Catalytic Activity for Cationic Polymerization, *Makromol. Chem.*, **81**, 92 (1965).
 36. J. Furukawa, T. Saegusa and S. Akuzu: Asymmetric-Selection Polymerization of d,l-Propylene Oxide by (FeCl₃-Propylene Oxide) Complex-H₂O Catalyst Containing d-Bornyl Ethyl Ether, *Makromol. Chem.*, **81**, 100 (1965).
 37. J. Furukawa, T. Fueno, Y. Takeda and Y. Hayakawa: Studies on the Mechanism of the Stereospecific Polymerization. (Asymmetric-induction Polymerization of Benzofuran by use of Optically Active Organostannic Compounds), *Makromol. Chem.*, **83**, 234 (1965).
 38. J. Furukawa, S. Yamashita, M. Maruhashi and K. Harada: Copolymerization of Phenyl Isocyanate with Ethylene Oxide, *Makromol. Chem.*, **84**, 80 (1965).
 39. J. Furukawa, T. Saegusa, S. Yasui and S. Akutsu: Asymmetric-Selection Polymerization of Propylene Oxide by Diethylzinc and D- or L-Glutamate System, *Makromol. Chem.*, **94**, 74 (1966).
 40. J. Furukawa, T. Saegusa and K. Tada: Polymerization of 2-Vinyl-1,3-Dioxolane, *Makromol. Chem.*, **95**, 168 (1966).
 41. R. Oda, S. Tokiura, F. Misumi and M. Okano: Syntheses of Condensation Polymer Having Pyrrolidone Group, *Chem., High Polymers (Japan)*, **17**, 685 (1960)*.
 42. R. Oda, S. Tokiura, A. Miyasu and M. Okano: Synthesis of Polyoxazolidone and its Ring Cleavage, *Chem. High Polymers (Japan)*, **17**, 72 (1960)*.
 43. M. Okano, S. Tokiura, A. Miyasu and R. Oda: Syntheses of Polymers Having Two Different Groups in 2:1 Ratio by Polycondensation, *Chem. High Polymers (Japan)*, **17**, 562 (1960)*.
 44. R. Oda, S. Tokiura, A. Miyasu and M. Okano: Syntheses of Polymers Having Regularly Repeating Groups by Polycondensation, *Chem. High Polymers (Japan)*, **16**, 266 (1959)*.
 45. R. Oda, S. Tokiura, A. Miyasu and M. Okano: Syntheses of High Polymers Containing Two

Different Linkage by Polyaddition or Polyaddition-Condensation, *Chem. High Polymers (Japan)*, **16**, 260 (1959).*

46. A. Oku, M. Okano and R. Oda: The Peroxide-induced Polymerization of Epoxides, *Bull. Chem. Soc., Japan*, **37**, 570 (1964).
47. M. Okano, A. Miiyasu, H. Hamada and R. Oda: Polymerization of 3-Substituted Oxazolidines, *Cheml High Polymers (Japan)*, **20**, 577 (1963).*
48. R. Oda, S. Munemiya and M. Okano: Polymerization of Ketene and Diketene, *Makromol. Chem.*, **43**, 149 (1961).
49. S. Tanimoto, T. Kunitomo and R. Oda: Syntheses of Some Polymer Acetals, *J. Chem. Soc., Japan, Pure Chem. Sect.*, **86** [947 (1965).*
50. S. Tanimoto, Y. Murao and R. Oda: Synthesis of Aldehyde-Catching Resin, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **65**, 682 (1962).*
51. C. Nakashima, S. Tanimoto and R. Oda: Synthesis of 2-(p-Vinylphenyl)propylene Oxide and its Polymerization, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **68**, 1726 (1965).*
52. T. Kunitomo, S. Tanimoto and R. Oda: Synthesis of p-Vinylbenzylmethylcarbionol and its Homologous Compounds and their Polymerization, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **68**, 1976 (1965).*
53. T. Kunitomo, S. Tanimoto and R. Oda: Syntheses of Condensation Polymers from Cyclopentadienylcarboxylic Esters, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **68**, 1963 (1965).*
54. S. Tanimoto and R. Oda: Synthesis of (p-Vinyl)phenethylalcohol and its Polymerization, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **64**, 932 (1961).*
55. H. Kawata, S. Tanimoto and R. Oda: Synthesis and Polymerization of p-(Piperidinomethyl) styrene and its Homologous Compounds, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **68**, (1965).*
56. R. Oda, S. Tanimoto, H. Kawata and M. Nomura: Synthesis of p-(N,N-Dialkylaminomethyl) styrene and their Polymerization, *J. Chem. Soc., Japan, Ind. Chem. Sect.*, **67**, 1654 (1964).*
57. Y. Murao, S. Tanimoto and R. Oda: Some Applications of the Bis-chloromethylated p-Xylene and Diphenyl Ether, *J. Chem. Sec., Japan, Ind. Chem. Sect.*, **66**, 1538 (1963).*