松下裕秀経歴

１．学歴

1977 年　名古屋大学工学部合成化学科卒業
1979 年　名古屋大学工学研究科修士課程修了
1982 年　名古屋大学工学研究科博士課程満了
1984 年　　工学博士（名古屋大学）

２．職歴

1982 年４月－1987 年７月　名古屋大学工学部助手
1987 年８月－1993 年１２月 名古屋大学工学研究科講師
1994 年１月－1994 年 7 月　名古屋大学工学研究科助教授
1994 年 7 月－1999 年３月　東京大学物性研究所助教授
1999 年４月－2020 年３月　名古屋大学工学研究科教授
2004 年４月－2007 年３月　名古屋大学総長補佐
2007 年４月－2013 年３月　名古屋大学副総長
2012 年４月－2013 年３月　名古屋大学創薬科学研究科長
2013 年４月－2015 年３月　名古屋大学工学研究科長
2015 年４月－2019 年３月　名古屋大学理事・副総長
2020 年３月　名古屋大学定年退職
2020 年４月－　豊田理化学研究所フェロー

これまでの研究成果

前項で触れたように、非相溶成分高分子を繋いだブロック共重合体は、メソスケールの周期構造を自発的に作る。この多相構造は、異種成分の結合性に直接依存して多様に変ってゆく。この項では、松下を中心とした研究グループからこれまでに生み出した周期構造・準周期構造のいくつかに焦点を当てて紹介する。分子設計の共通項は「フラストレーションを持つ系」である。説明はスライドの図に準拠する形で進める。

1　ABC 3成分3元共重合体が作る超格子構造　スライド1

3つの成分が線状につながったABCのB鎖は、凝集構造中ではブリッジ型の形態を採ることを余儀なくされるため、特徴的な構造構築原理が働く。組成変化は多様であるが、ここでは A 成分、C 成分の分率が等しい系に絞る。具体的な物質は、A, B, C として I(polyisoprene)、S(polystyrene), P(poly(2-vinylpyridine) を選び、試料はアニオン重合法により精密合成した分子量分布の極めて狭い ISP3元共重合体 である。両端ブロック I, P の体積分率と全長を常に一定とし、中央 S の長さを変えたシリーズの構造を**スライド1**に示す。左から両端が長い場合は、2分子長を繰返し周期とした 3相4層ラメラ構造 を呈するが、S が50%を超えると I, P が S マトリックス中で3分岐ネットワークを張った 3相共連続 Gyroid 構造 に転移し、67%を超えると 正方充填柱状構造 、そして80%以上になると C_SCl 型 BCC 構造に転移する。これらはどれも I, P ドメインが幾何学的に互換の 超格子構造 である。

2　ABC 線状共重合体二様ブレンドからのダイヤモンド構造　スライド2

スライド2に示すように、個々の分子は組成に偏りを有するが、末端鎖が互いに相補的な長さを持つものを用意し、そのブレンドの構造を観察したところ、4分岐の二重ダイヤモンド構造 が得られた。4分岐は3分岐に比べ、界面の曲率変化が大きく曲面の位置によって環境が異なるが、この二様分布の設計により界面エネルギーや配置エントロピーを犠牲にしながらも個々の分子が局在配置して形態エントロピーを稼いだために、総自由エネルギーを下げたためである。これも分子自身には弱いストレスがかかった系である。

3　ABC 星型ブロック共重合体が作る周期・準周期タイリング　　スライド3，4

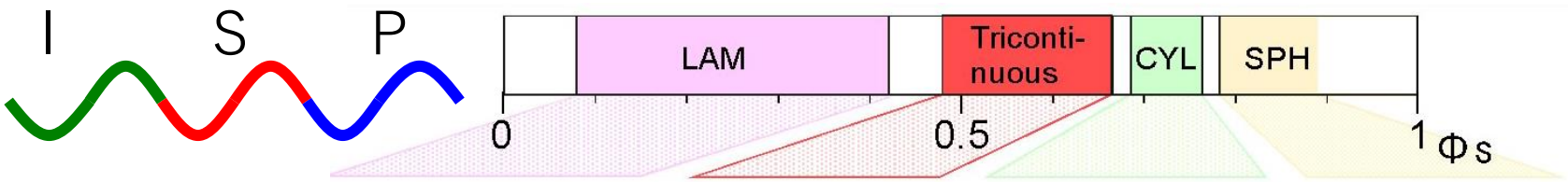
3つの高分子成分を1点で結んだ 星型共重合体 では、結合点が1次元にしか並べないために個々のブロック鎖は窮屈な空間に閉じ込められる。その相分離界面には結合点がないために平らな界面となり、断面は多角形を敷き詰めた模様、つまりタイリングを呈することになる。**スライド3**には模式的なスケッチと、成分の長さの比が変わった時のいろいろなタイリングが示してある。その中心には 準周期タイリング が位置している。これは**スライド**

4 に詳細に示すように、**１２回対称準結晶** の特徴を備えていることが判明した。合金系で初めて準結晶構造が得られてから２５年記念にあたる 2007 年の発見であった。合金系に比べるとタイルサイズが約１００倍であることが大きな特徴である。なお、この分野のパイオニアであるイスラエル工科大の D.Shechtman 教授は 2011 年に「準結晶の発見」の業績により、ノーベル化学賞を受賞している。

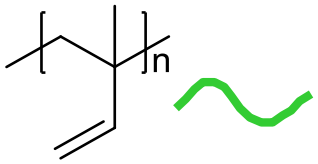
４　**A_1BA_2C ３成分４元共重合体の構造構築　スライド５**

同じ高分子成分でありながら分子内に環境の異なる二つのブロック鎖として配置した **A_1BA_2C３成分４元共重合体** では、分子自身にフラストレーションが内包されているために、特徴的な構造を作る。**スライド５** には左側に２種の S_1IS_2P 共重合体の六方充填構造、正方充填構造が示してある。これら２種をブレンドしたものが左側に比較して載せてある。上段は **3.3.4.3.4 アルキメデスタイリング構造**、下段は **12 回対称準結晶構造** である。これら両者は比較的広い混合比の範囲で見られることも判明した。分子のフラストレーションが、集合体の構造に反映されたものである。

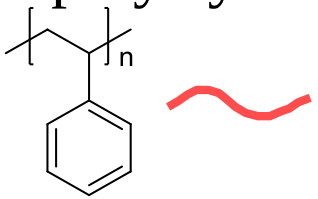
ISP ３元共重合体の超格子構造



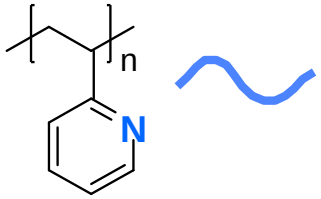
I：polyisoprene

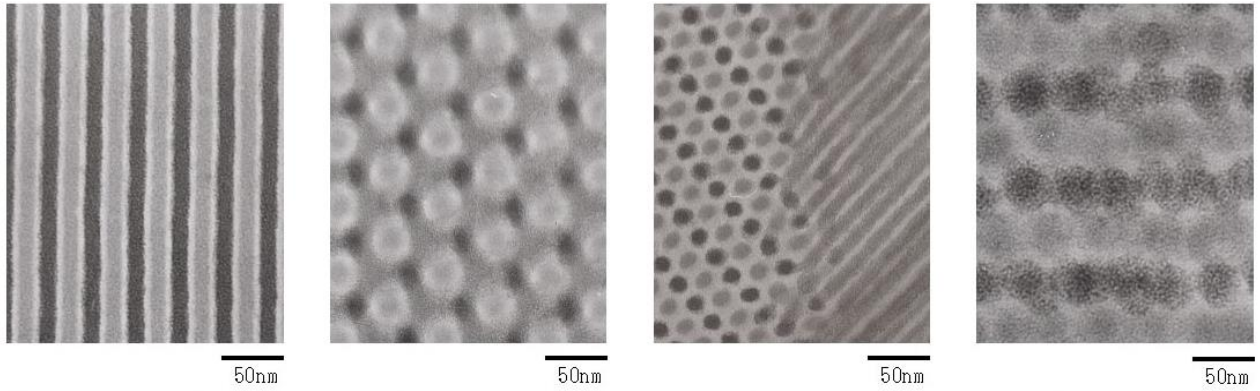


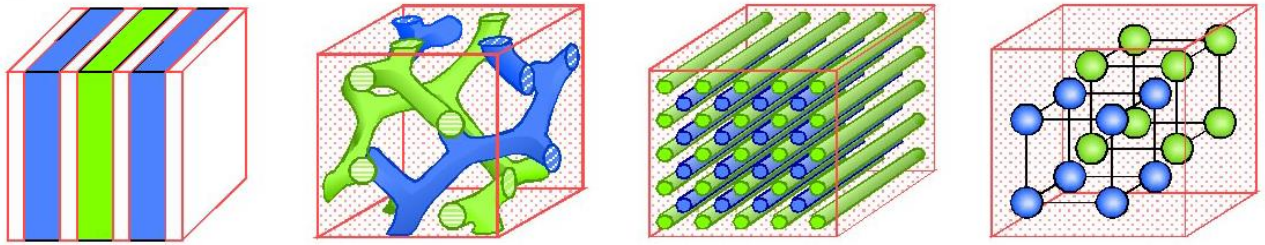
S: polystyrene



P：poly(2-VP)







Four-layered structure

Tricontinuous Gyroid

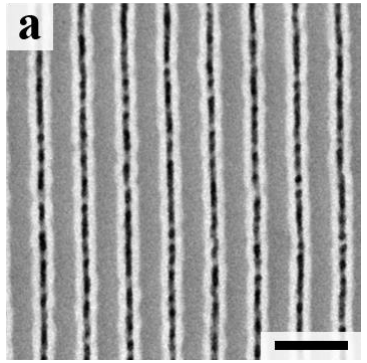
Tetragonal cylinders

BCC of the CsCl type

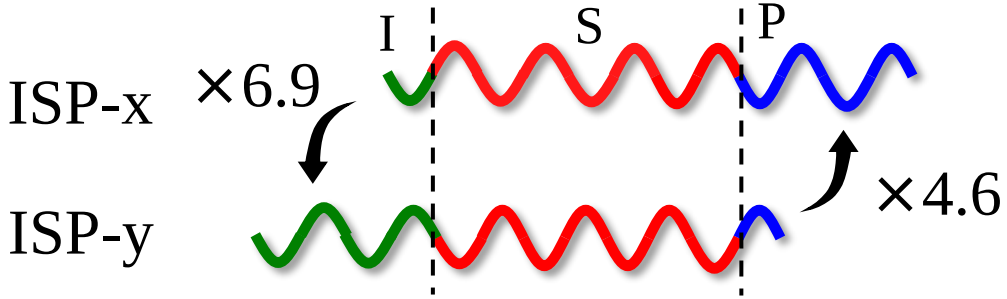
超格子構造

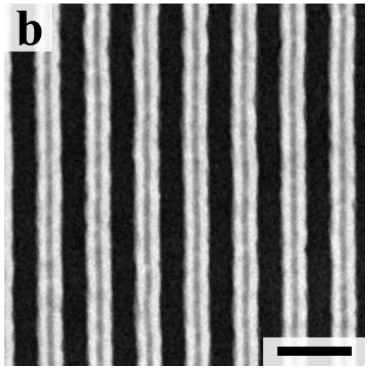
Macromolecules **27**, 6755-6760(1994)　　*J.Chem.Phys.*, **112**, 4862(2000)

３元系二様ブレンドからダイヤモンド創出

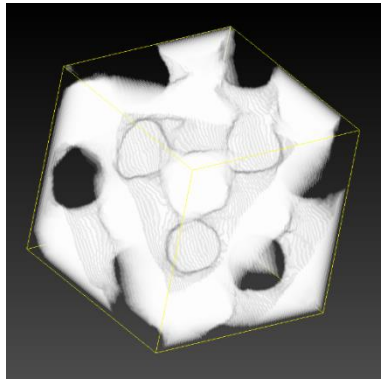


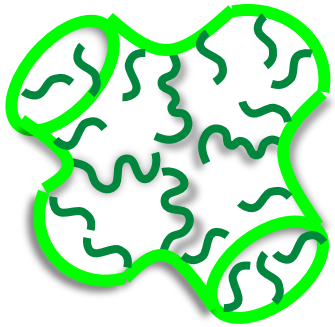
ISP-x　100nm

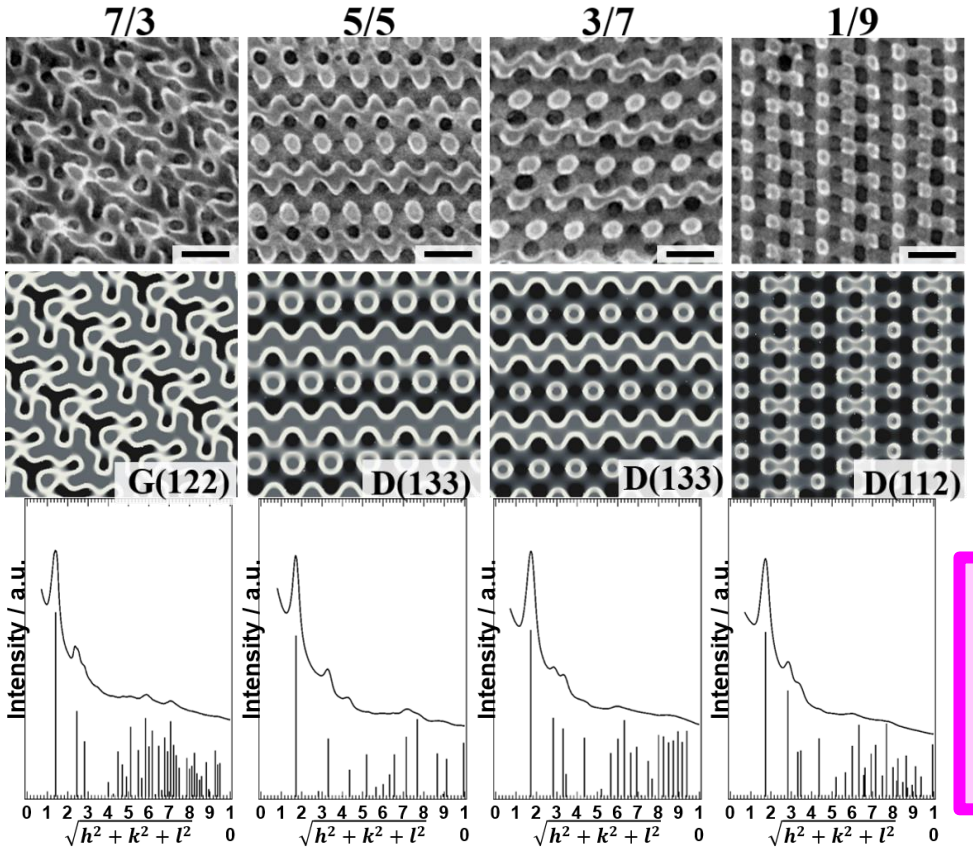


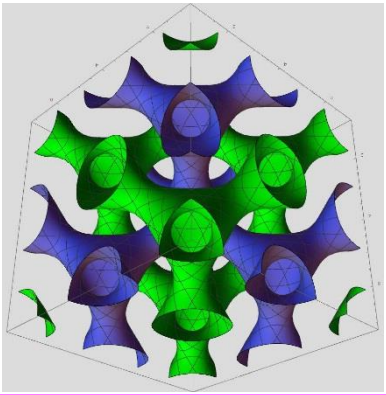


ISP-y　100nm





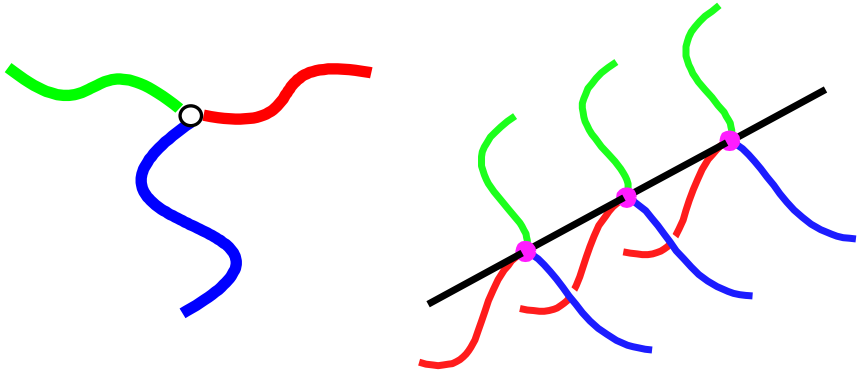




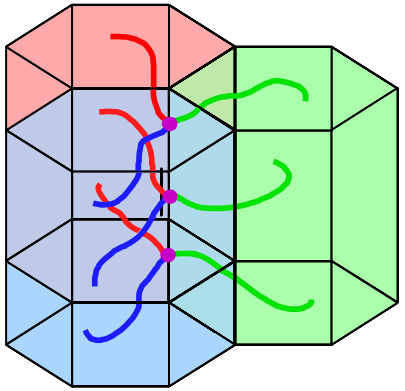
Tricontinuous
Double
Diamond

Macromolecules **50**, 5402(2017)

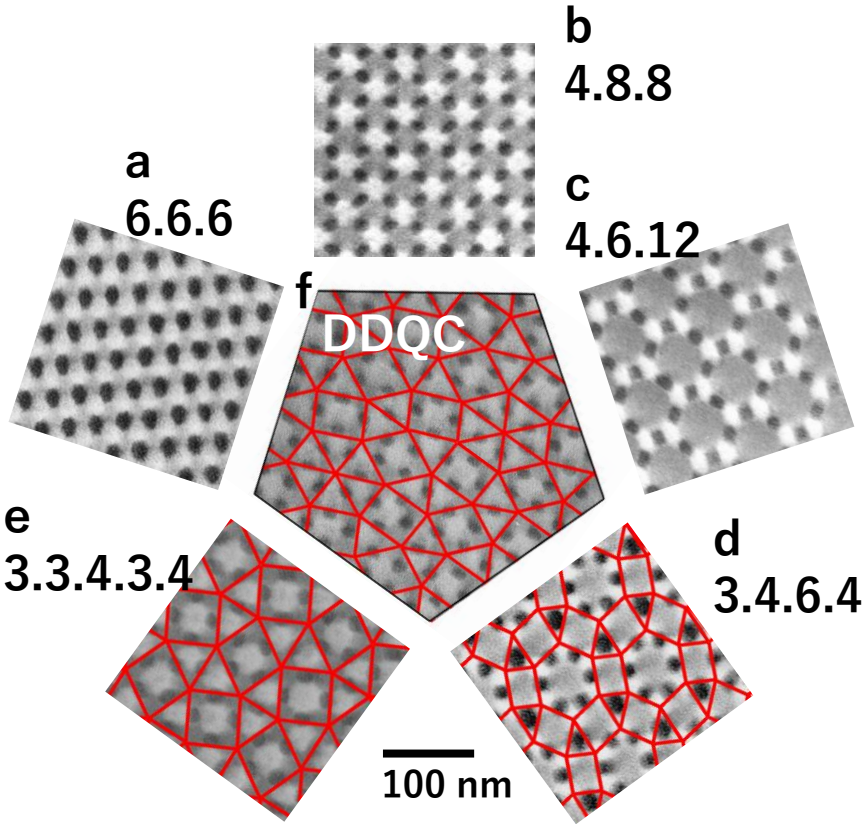
３つが１点で結ばれた星型共重合体



棒状になりやすい
→断面はタイリング

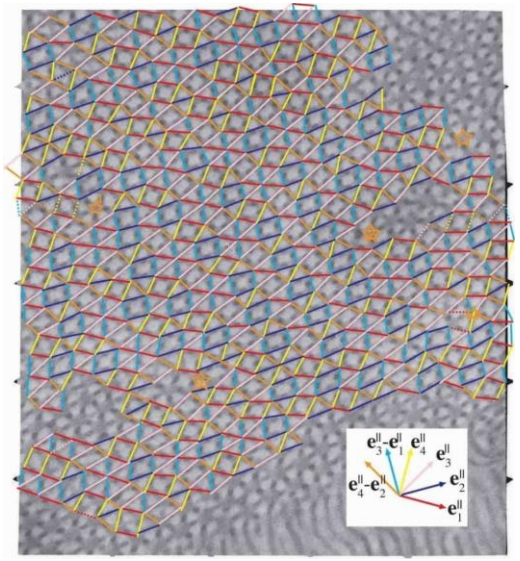


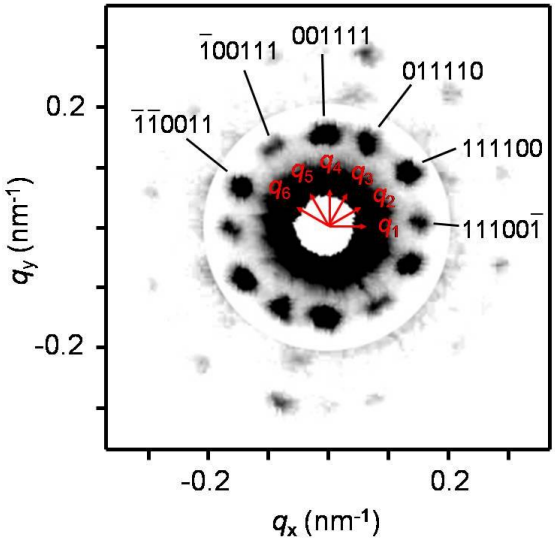
ナノスケールの
寄木細工



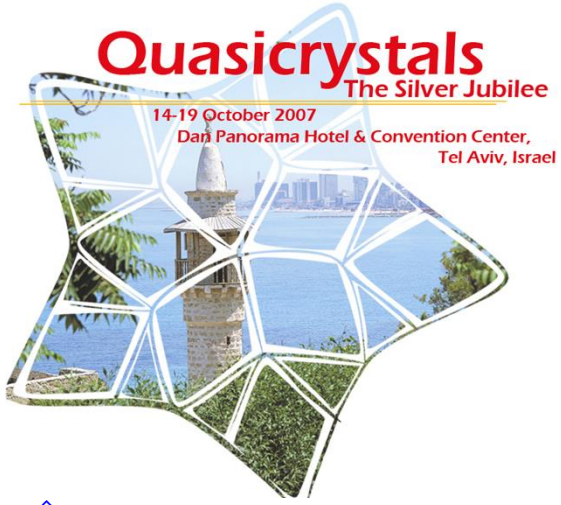
$I_{1.0}S_YP_{2.0}$シリーズの周期・準周期構造

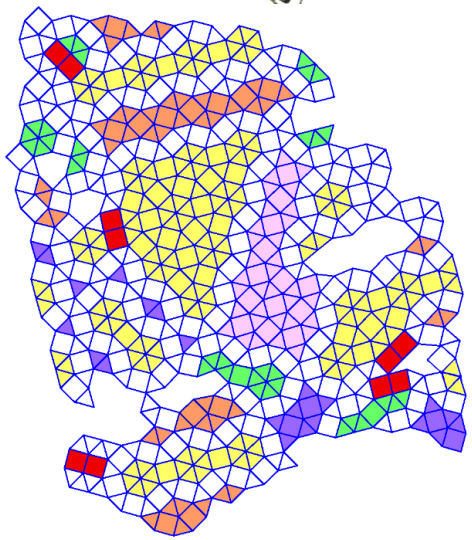
準結晶発見２５年の記念の年に　そして２０１１年





古典結晶学の掟破り！！

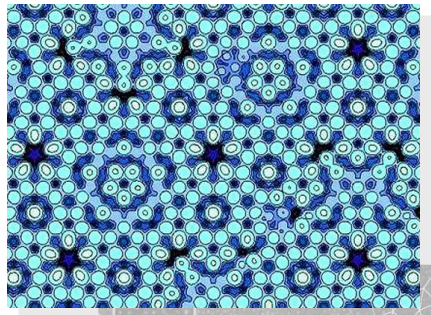




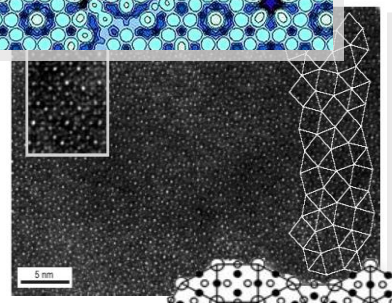
Phys.Rev. Lett., **2007**, 98, 195502.

D. Shechtman

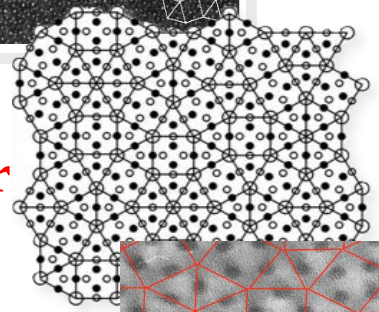
2011 ノーベル化学賞



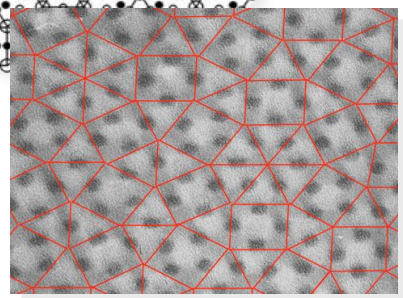
0.5 nm
alloy **$Al_{80}Mn_{20}$**
in **1982**



2 nm
$Ta_{1.6}Te$
in **1998**



10 nm
Dendrimer
in **2004**



50 – 100 nm
Star Polymers
in **2007**

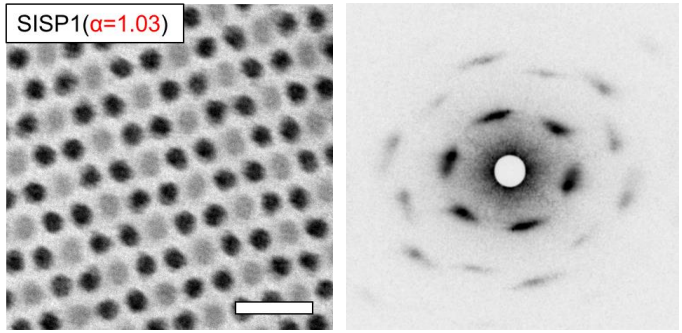
３成分４元共重合体ブレンドからも準結晶

I : Polyisoprene **S** : Polystyrene
P : Poly(2-vinylpyridine)

S1IS2P-1

34 – 14 – 33 – 16

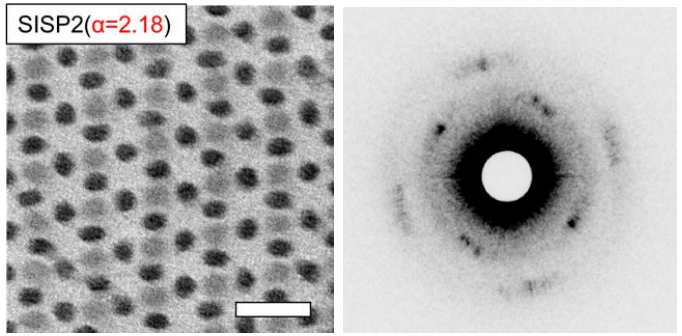
$\alpha(\phi_{S1}/\phi_{S2}) = 1.03$



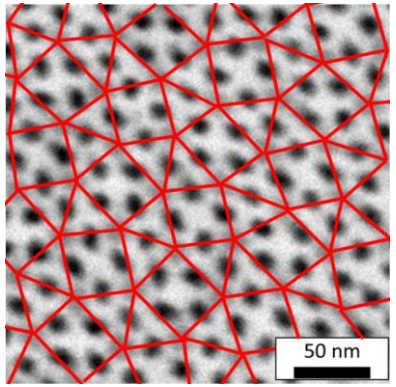
S1IS2P-2

55 – 15 – 25 – 20

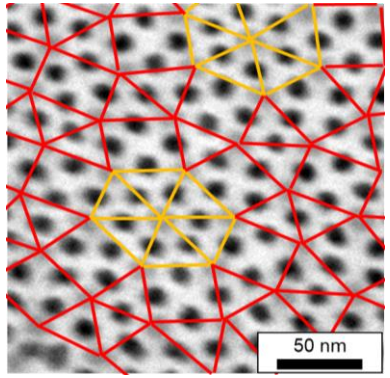
$\alpha(\phi_{S1}/\phi_{S2}) = 2.16$



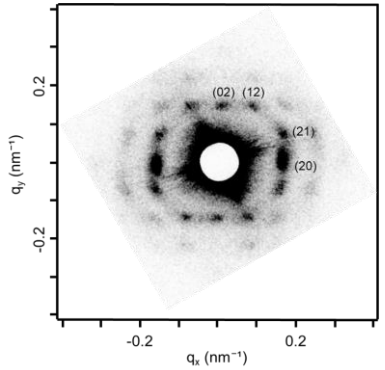
12_20/80



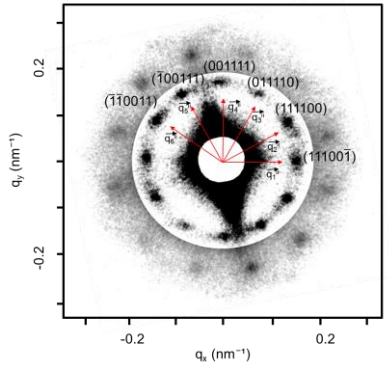
12_56/44



(3.3.4.3.4) 構造



12回対称準結晶



ACS Macro Lett. **9**, 32(2020).

松下裕秀　業績リスト

1. "Preparation and Morphological Properties of a Triblock Copolymer of the ABC Type"
Y. Matsushita, H, Choshi, T. Fujimoto, M. Nagasawa
Macromolecules **13**, 1053-1058, (1980).

2. "Preparation and Characterization of Block Copolymers of Ordinary and Deuterated Styrenes"
Y. Matsushita, H. Furuhashi, H. Choshi, I. Noda, M. Nagasawa, T. Fujimoto, C.C. Han
Polym. J. **14**, 489-493(1982).

3. "Morphologies of ABC-Type Triblock Copolymers with Different Compositions"
Y. Matsushita, K. Yamada, T. Hattori, T. Fujimoto, Y. Sawada, M. Nagasawa, C. Matsui
Macromolecules **16**, 10-13(1983).

4. "Expansion Factor of a Part of a Polymer Chain in a Good Solvent Measured by Small-Angle Neutron Scattering"
Y. Matsushita, I. Noda, M. Nagasawa, T.P. Lodge, E.J. Amis, C.C. Han
Macromolecules **17**, 1785-1789(1984).

5. "Preparation and Characterization of Poly(2-vinylpyridine)s with Narrow Molecular Weight Distributions"
Y. Matsushita, K. Shimizu, Y. Nakao, H. Choshi, I. Noda, M. Nagasawa
Polym. J. **18**, 361-366(1986).

6. "Studies of Styrene and 2-Vinylpyridine Block Copolymers; Preparation and Characterization"
Y. Matsushita, Y. Nakao, R. Saguchi, H. Choshi, M. Nagasawa
Polym. J. **18**, 493-499(1986).

7. "Conformations of Diblock Copolymers in Dilute Solutions"
Y. Matsushita, Y. Nakao, K. Shimizu, I. Noda, M. Nagasawa
Macromolecules **21**, 2790-2793(1988).

8. "Phase Contrast Matching in Lamellar Structures Composed of Mixtures of Labeled and Unlabeled Block Copolymers for Small-Angle Neutron Scattering"
Y. Matsushita, Y. Nakao, R. Saguchi, K. Mori, H. Choshi, Y. Muroga, I. Noda, M. Nagasawa, T. Chang, C.J. Glinka, C.C. Han
Macromolecules **21**, 1802-1806(1988).

9. "Molecular Weight Dependence of Lamellar Domain Spacing of Diblock Copolymers in Bulk"

Y. Matsushita, K. Mori, R. Saguchi, Y. Nakao, I. Noda, M. Nagasawa
Macromolecules **23**, 4313-4316(1990).
10. "Chain Conformation of a Block Polymer in a Microphase-Separated Structure"
Y. Matsushita, K. Mori, Y. Mogi, R. Saguchi, I. Noda, M. Nagasawa, T. Chang, C.J. Glinka, C.C. Han
Macromolecules **23**, 4317-4321(1990).
11. "Chain Conformations and Locations of Parts of a Block Polymer in a Lamellar Structure"
Y. Matsushita, K. Mori, R. Saguchi, I. Noda, M. Nagasawa, T. Chang, C.J. Glinka, C.C. Han
Macromolecules **23**, 4387-4391(1990).
12. "Chain Conformation of Block Copolymers in Dilute Solutions Measured by Small-Angle Neutron Scattering"
Y. Matsushita, K. Shimizu, I. Noda, T. Chang, C.C. Han
Polymer, **23**, 2412-2415(1992).
13. "Preparation and Morphology of Triblock Copolymers of the ABC Type"
Y. Mogi, H. Kotsuji, Y. Kaneko, K. Mori, Y. Matsushita, I. Noda
Macromolecules, **25**, 5408-5411(1992).
14. "Tricontinuous Morphology of Triblock Copolymers of the ABC Type"
Y. Mogi, K. Mori, Y. Matsushita, I. Noda
Macromolecules, **25**, 5412-5415(1992).
15. "Molecular Weight Dependence of Lamellar Domain Spacing and Chain Conformation of ABC Triblock Copolymers in Microphase-separated Structure."
Y. Mogi, K. Mori, H. Kotsuji, Y. Matsushita, I. Noda, C.C. Han
Macromolecules **26**, 5169-5173(1993).
16. "Localization of a Homopolymer Dissolved in a Lamellar Structure of a Block Copolymer Studied by Small-Angle Neutron Scattering"
Y. Matsushita, Y. Mogi, N. Torikai, I. Noda, C.C. Han
Macromolecules **26**, 6346-6349(1993).
17. "Preparation and Morphology of Multiblock Copolymers of the (AB)n Type"
Y. Matsushita, J. Watanabe, Y. Mogi, H. Mukai, I. Noda
Polymer **35**, 246-249(1994).
18."Tricontinuous Double-Diamond Structure Formed by a Styrene-Isoprene-2-Vinylpyridine Triblock Copolymer"
Y. Matsushita, M. Tamura, I. Noda
Macromolecules **27**, 3680-3682(1994).

19. "Preparation and Morphologies of 4-Arm and 12-Arm Styrene-Isoprene Star-Shaped Block Copolymers"
Y. Matsushita, T. Takasu, K. Yagi, K. Tomioka, I. Noda
Polymer **35**, 2862-2866(1994).
20. "Chain Conformations of Homopolymers Dissolved in a Microphase of a Block Copolymer"
Y. Matsushita, Y. Mogi, K. Mori, I. Noda, C.C. Han
Macromolecules **27**, 4566-4569(1994).
21. "Super Lattice Structure in Morphology of the ABC Triblock Copolymers"
Y. Mogi, H. Kotsuji, M. Nomura, K. Ohnishi, Y. Matsushita, I. Noda
Macromolecules **27**, 6755-6760(1994).
22. "Alternating Lamellar Structure of Triblock Copolymers of the ABA Type"
Y. Matsushita, M. Nomura,J. Watanabe, Y. Mogi, I. Noda, M. Imai
Macromolecules **28**, 6007-6013(1995).
23. "Preparation and Characterization of ABB Graft Copolymers"
Y. Matsushita, J. Watanabe, F. Katano, Y. Yoshida, I. Noda
Polymer **37**, 321-325(1996).
24. "Morphologies and Domain Sizes of Microphase-Separated Structures of Block and Graft Copolymers of Different Types"
Y. Matsushita, I. Noda, N. Torikai
Macromol. Symp. **106**, 121-133(1997).
25. "Lamellar Domain Spacing of the ABB Graft Copolymers"
Y. Matsushita, H. Momose, Y. Yoshida, I. Noda
Polymer **38**, 149-153(1997).
26. "Neutron Reflection Studies on Segment Distribution of Block Chains in Lamellar Microphase-separated Structures"
N. Torikai, I. Noda, A. Karim, S.K. Satija, C.C. Han, Y. Matsushita, T. Kawakatsu
Macromolecules **30**, 2907-2914(1997).
27. "Lamellar Domain Spacings of Diblock Copolymer/Homopolymer Blends and Conformations of Block Chains in Their Microdomains"
N. Torikai, N. Takabayashi, I. Noda, S. Koizumi, Y. Morii, Y. Matsushita
Macromolecules **30**, 5698-5703(1997).
28. "Order-Disorder Transition of Symmetric Poly(styrene-b-2-vinylpyridine) in Bulk and Solution"
Y. Takahashi, S. Kitade, M. Noda, N. Ochiai, I. Noda, M. Imai, Y. Matsushita
Polym. J. **30**, 388-393(1998).

29. "Chain Dimensions of Mid-blocks of ABA Triblock Copolymers with Lamellar Structures in Bulk"
Y. Matsushita, J. Suzuki, N. Takabayashi, N. Torikai, M.Nomura, I. Noda
Macromolecules **30**, 2378-2380(1998).
30. "Surfaces of Tricontinuous Structures formed by ABC Triblock Copolymers in Bulk"
Y. Matsushita, J. Suzuki, M. Seki
Physica B, 248, 238-242(1998).
31. “Concentration Dependence of Radius of Gyration of Sodium Poly(styrene sulfonate) over a Wide Range of Concentration Studied by Small-Angle Neutron Scattering”
Y. Takahashi, N. Matsumoto, S. Iio, H. Kondo, I. Noda, M. Imai, Y. Matsushita
Langmuir **15**, 4120-4122(1999)
32."Ring Structure of Cyclic Poly(2-vinylpyridine) Proved by Pyrolysis-GC/MS"
H.Ohtani, H.Kotsuji, H.Momose, Y.Matsushita, I.Noda, S.Tsuge
Macromolecules **32**, 6541-6544(1999).
33."Miscibility of Isotactic Polypropylene/Ethylene-Propylene Random Copolymer Binary Blends"
M.Seki, H.Nakano, S.Yamauchi, J.Suzuki, Y.Matsushita
Macromolecules **32**, 3227-3234(1999).
34. “Small-angle X-ray Scattering Analysis of the Periodic Tricontinuous Network Structure of Symmetric ABC Triblock Copolymers”
M. Seki, J. Suzuki, Y. Matsushita
J. Appl. Crystallogr. *33*, 285-290(2000).
35. “The Tricontinuous Double-Gyroid Structure from a Three-component Polymer System”
J.Suzuki, M.Seki, Y.Matsushita
J. Chem.Phys. **112**, 4862-4868(2000).
36. “Studies on Equilibrium Structures of Complex Polymers in Condensed Systems”
Y. Matsushita
J. Polym. Sci.,Part B, Polym.Phys. Ed. **38**,1645-1655(2000).
37. “Study on the Thermodynamic Interactions between Isotactic Polypropylene and Ethlene-hexene Random Copolymers by SANS”
M.Seki, H.Uchida, Y.Maeda, S.Yamauchi, K.Takagi, Y.Ukai, Y.Matsushita
Macromolecules **33**, 9712-9719(2000)
38. “Mesoscopic patterns of block and graft copolymers in condensed systems” Y.

Matsushita
Macromol. Symp. **160**, 151-158 (2000).
39. “Preparation and Morphology of Model Graft Copolymers of the A_3 B_2 Type with Different Graft Junction Points”
A. Takano, K. Kondo, M. Ueno, K. Ito, S. Kawahara, Y. Isono, J. Suzuki, Y. Matsushita
Polym. J. **33**, 732-740(2001)
40. Morphology of ABC Triblock Copolymer/Homopolymer Blend System
Jiro Suzuki, Motofumi Furuya, Minobu Iinuma, Atsushi Takano, Yushu Matsushita
J.Polym.Sci. Polym. Phys.Ed. **40**, 1135-1141(2002)
41. Preparation and Characterization of Cyclic Polystyrene with Short Poly (2-*tert*-butyl-butadiene) sequence
A. Takano, A. Nonaka, O. Kadoi, K. Hirahara, S. Kawahara, Y. Isono, N. Torikai, Y. Matsushita
J.Polym.Sci., Polym. Phys.Ed. **40**, 1582-1589(2002)
42. Preparation and Morphology of Ring-shaped Polystyrene-*block*-polyisoprenes
D. Takano, O. Kadoi, K. Hirahara, S. Kawahara, Y. Isono, J. Suzuki, Y. Matsushita
Macromolecules **36**, 3045-3050(2003)
43. Effect of Composition Distribution on Microphase-separated Structure from Diblock Copolymers
Y. Matsushita, M. Iinuma, A. Noro, J. Suzuki, H. Ohtani, A. Takano
Macromolecules **36**, 8074-8077(2003)
44. Observation of Four Phase Lamellar Structure from a Tetrablock Copolymer of the ABCD Type
A. Takano, K. Soga, T. Asari, J. Suzuki, S. Arai, H. Saka, Y. Matsushita
Macromolecules **36**, 8216-8218 (2003).
45. Non-centrosymmetric Structure with Nanoscopic Periodicity from a Tetrablock Copolymer of the ABCA Type
A. Takano, K. Soga, J. Suzuki, Y. Matsushita,
Macromolecules **36**, 9288-9291 (2003).
46. Effect of Composition Distribution on Microphase-Separated Structure from BAB Triblock Copolymers
A. Noro, M. Iinuma, J. Suzuki, A. Takano, Y. Matsushita
Macromolecules **37**, 3804-3808(2004).
47. Chain Elongation Suppression of Cyclic Block Copolymers in Lamellar Microphase-Separated Bulk
Y. Matsushita, H. Iwata, T. Asari, T.Uchida, G. ten Brinke, A. Takano
J. Chem. Phys. **121**, 1129-1132(2004)

48. Preparation of Partially Deuterium-labelled Poly(4-trimethylsilylstyrene)s and Their Unperturbed Dimensions in Bulk
M.Harada, T. Suzuki, M.Ohya, A. Takano, Y. Matsushita
Polymer J. **38**, 538-541(2004)
49. Observation of Cylinder-based Microphase-separated Structures from ABC Star-shaped Terpolymers Investigated by Electron Computerized Tomography
A. Takano, S. Wada, S. Sato, T.Araki, T. Kazama, S. Kawahara, Y. Isono, A. Ohno, N.Tanaka, Y. Matsushita
Macromolecules **37**, 9941-9946(2004)
50. Self Assembly Template During Morphological Transition of a Linear ABC Triblock Copolymer from Lamellar to Gyroid Structure
J.Suzuki, K. Nakane, A. Takano, Y. Matsushita
Polymer **45**, 8989-8997(2004).
51. Nobel Miscible Polymer Blend of Poly(4-trimethlysilylstyrene) and Polyisoprene
M. Harada, T. Suzuki, M.Ohya, A.Takano, Y. Matsushita
Macromolecules, **38,** 1868-1873(2005).
52. Preparation and Phase Behavior of Poly(4-trimethylsilylstyrene)-block-polyisoprene
M. Harada, M. Ohya, T. Suzuki, D. Kawaguchi, A. Takano, Y.Matsushita
J. Polym. Sci. Polym. Phys. **43**,1214-1219(2005).
53.TGIC Separation of PS-b-P2VP Diblock & P2VP-b-PS-b-P2VP Triblock Copolymers According to Chemical Composition
D. Cho, A. Noro, A. Takano, Y. Matsushita
Macromolecules **38**, 3033 – 3036(2005).
54. Interfacial Profiles of Miscible Poly(4-trimethylsilylstyrene)/ polyisoprene Bilayer Films
M. Harada, T. Suzuki, M. Ohya, D.Kawaguchi, A. Takano, Y. Matsushita, N. Torikai
J. Polym. Sci. Polym. Phys. Ed., **43**,1486-1494(2005)
55. Effect of Molecular Weight Distribution on Microphase-separated Structures from Block Copolymers
A. Noro, D. Cho, A. Takano, Y. Matsushita
Macromolecules **38**, 4371 – 4376(2005).
56. Preparation and Characterization of Cyclic Polystyrenes
D.Cho, K.Masuoka, K. Kohguchi, T. Asari, A. Takano, Y. Matsushita
Polymer J. **37**, 506 – 511(2005)
57. A Mesoscopic Archimedean Tiling Having a New Complexity in an ABC Star Polymer
B. Takano, W. Kawashima, A. Noro, Y. Isono, N. Tanaka, T. Dotera, Y. Matsushita

J. Polym. Sci. Polym. Phys. Ed. **43**, 2427-2432(2005).

58. Novel Synthesis and Characterization of Bioconjugate Block Copolymers Having Oligonucleotides

A. Noro, Y. Nagata, M. Tsukamoto, Y. Hayakawa, A. Takano, Y. Matsushita

Biomacromolecules **6**, 2328-2333(2005)

59. Three Phase Hierarchical Structures from AB/CD Diblock Copolymer Blends with Complemental Hydrogen Bonding Interaction

T.Asari, S. Matsuo, A. Takano, Y. Matsushita

Macromolecules **38**, 8811-8815(2005).

60. Effect of Loop/Bridge Conformation Ratio on Elastic Properties of the Sphere-Forming ABA Triblock Copolymers: Preparation of Samples and Determination of Loop/Bridge Ratio

A. Takano, I. Kamaya, Y. Takahashi, Y. Matsushita

Macromolecules **38**, 9718-9723(2005)

61. Effect of Loop/Bridge Conformation Ratio on Elastic Properties of the Sphere-Forming A-B-A Triblock Copolymers under Uniaxial Elongation

Y. Takahashi, Y. Song, N. Nemoto, A. Takano, Y. Akazawa, and Y. Matsushita, *Macromolecules* **38**, 9724-9729(2005).

62. Preparation and Characterization of a Styrene-Isoprene Undecablock Copolymer and Its Hierarchical Microdomain Structure in Bulk

Y.Nagata, J. Masuda, A.Noro, D.Cho, A.Takano, Y.Matsushita

Macromolecules **38**, 10220-10225 (2005).

63. Preparation and Characterization of Diblock Copolymers of the AB and CD Types and Their Self-Assembled Structure by Hydrogen Bonding Interaction

T. Asari, S. Matsuo, A. Takano, Y. Matsushita

Polym. J. , 38, 258 - 263(2006).

64. Archimedean Tiling Structures from ABA/CD Block Copolymer Blends Having Intermolecular Association with Hydrogen Bonding

T. Asari, S. Arai, A. Takano, Y. Matsushita

Macromolecules **39**, 2232 - 2237(2006).

65. A Diblock-Type Supramacromolecule via Biocomplementary Hydrogen Bonding

A. Noro, Y.Nagata, A Tanako, Y. Matsushita

Biomacromolecules **7**, 1696-1699(2006).

66. Archimedean Tiling Patterns of ABC Star-shaped Terpolymers Studied by Micro-beam Small Angle X-ray Scattering

K.Hayashida, W.Kawashima, A.Takano, Y. Shinohara, Y. Amemiya[2] Y. Nozue,

Y.Matsushita
Macromolecules **39**, 4869-4872(2006).
67. Comparison of Interdiffusion Behavior between Cyclic and Linear Polystyrenes with High Molecular Weights
D.Kawaguchi, K. Masuoka, A. Takano, K. Tanaka, T. Nagamura, N. Torikai, R. M. Dalgliesh, S. Langridge, Y. Matsushita
Macromolecules **39**, 5180-5182(2006).
68. Nanophase-separated Synchronizing Structure with Parallel Double Periodicity from an Undecablock Terpolymer
J. Masuda, Y.Nagata, A. Noro, A. Takano, Y. Matsushita
Phys. Rev. Lett. **97**, 098301(2006).
69. Chain Localization and Interfacial Thickness in Microphase-Separated Structures of Block Copolymers with Variable Composition Distributions
A. Noro, M. Okuda, F. Odamaki, D. Kawaguchi, N. Torikai, A. Takano, Y. Matsushita
Macromolecules **39**, 7654-7661,2006.
70. Systematic Transition of the Tiling Patterns Formed by ABC Star-shaped Terpolymers
K. Hayashida, A. Takano, S. Arai, Y. Shinohara, Y. Amemiya, Y. Matsushita
Macromolecules **39**, 9402-9408 (2006).
71. Investigation of Miscibility between iPP and propylene-butene random copolymer by Small angle Neutron Scattering
Y. Nozue, T. Sakurai, H. Hozumi, T. Kasahara, N. Yamaguchi, M. Shibayama, Y. Matsushita
Macromolecules **40**,273-277(2007)
72. HPLC characterization of cyclization reaction product obtained by end-to-end ring closure reaction of a telechelic polystyrene.
A.Takano, Y.Kushida, K.Aoki, K.Masuoka, K.Hayashida, D.Cho, D.Kawaguchi, Y.Matsushita
Macromolecules, **40**, 679-681(2007)
73. The Creation of Hierarchically-Ordered Nanophase Structures In Block Polymers Having Various Competing Interactions
Y. Matsushita
Macromolecules, **40**, 771-776 (2007)
74. Polymeric Quasicrystal: Mesoscopic Quasicrystalline Tiling in *ABC* Star Polymers
K. Hayashida, A. Takano, T. Dotera, Y. Matsushita
Phys. Rev. Lett., **98**, 195502 (2007)

75. Hierarchical Morphologies Formed by ABC Star-Shaped Terpolymers
K. Hayashida, A. Takano, N.Tanaka , Y. Matsushita
Macromolecules **40**,3695-3699(2007).
75. Composition-Dependent Morphological Transition of Hierarchically-Ordered Structures formed by Multiblock Terpolymers
J. Masuda, A. Takano, J. Suzuki, Y. Nagata, A. Noro, K. Hayashida, Y. Matsushita
Macromolecules **40**,4023-4027(2007).
76. Composition dependence of Nanophase-separated Structures Formed by Star-shaped Terpolymers of the $A_{1.0}B_{1.0}C_X$ type
A.Takano, W. Kawashima, S. Wada, K.Hayashida, S. Sato, K. Hirahara, S. Kawahara, Y. Isono, N. Tanaka D. Kawaguchi and Y.Matsushita
J.Polym. Sci., Part B, Polym. Phys. **45**, 2277-2283(2007).
77. Neutron Reflectometry on Interfacial Structures of the Thin Films of Polymer and Lipid
N. Torikai, N. Yamada, A. Noro, M. Harada, D. Kawaguchi, A. Takano, Y. Matsushita
Polymer J., **39**, 1238-1246(2007).
78. Temperature Dependence of Surface Segregation in Miscible Polymer Blend of Poly(4-trimethylsilylstyrene)/Polyisoprene
D. Kawaguchi, M. Ohya, N. Torikai, A.Takano, Y. Matsushita
Polymer J., **39**, 1274-1280(2007).
79. Precise Molecular Design of Complex Polymers and Morphological Control of Their Hierarchical Multiphase Structures
Y. Matsushita
Polymer J., **40**, 177-183 (2008).
80. Preparation, Characterization, and Nanophase-Separated Structure of Catenated Polystyrene-Polyisoprene
Y. Ohta, Y. Kushida, D. Kawaguchi, Y. Matsushita, A. Takano
Macromolecules **41**, 3957-3961(2008)
81.Thermoreversible Supramacromolecular Ion Gels via Hydrogen Bonding
A.Noro, Y.Matsushita, T.Lodge
Macromolecules, **41**, 5839-5844(2008).
82. Topological Effect in Ring Polymers Investigated with Monte Carlo Simulation
J. Suzuki, A. Takano, Y. Matsushita
J. Chem. Phys. **129**, 034903(2008).
83. Giant Zinc-Blende Structures Formed by ABC Star-Shaped Terpolymers

K. Hayashida, A. Takano, T. Dotera, Y. Matsushita
Macromolecules **41**, 6269-6271(2008)
84 Nanophase-Separated Structures of AB block Copolymer/C Homopolymer Blends with Complimentary Hydrogen Bonding Interaction
K. Dobrosielska, S. Wakao, A. Takano, Y. Matsushita
Macromolecules **41**, 7695-7698(2008)
85.Stoichiometric Effects on Nanostructures of Block- and Graft-Type Supramacromolecules via Acid-Base Complexation
A. Noro, A.Tamura, A. Takano, Y. Matsushita
Macromolecules **41**, 9277-9283(2008).
86. SEC-MALS Characterization of Cyclization Reaction Products: Formation of Knotted Ring Polymer
Y.Ohta, Y.Kushida, Y.Matsushita, A.Takano,
Polymer, **50**, 1297-1299(2009)
87 The Second Virial Coefficients of Highly-purified Ring Polystyrenes in Cyclohexane
A.Takano Y.Ohta, Y.Kushida, Y.Matsushita,
Polymer, **50**, 1300-1303(2009)
88 Hierarchical Nanophase-Separated Structures Created by Precisely- Designed Polymers with Complexity
Y. Matsushita, A.Takano, K. Hayashida, T. Asari, A. Noro
Polymer **50**, 2191-2203(2009)
89. Gelation Mechanism of Thermoreversible Supramacromolecular Ion Gels via Hydrogen Bonding
A. Noro, T.P. Lodge, Y. Matsushita
Macromolecules **42**, 5802-5810(2009).
90. Thermoreversible Morphology Transition from Block-Type Supramacromolecules via Hydrogen Bonding in an Ionic Liquid
A. Noro, H. Yamagishi, Y. Matsushita
Macromolecules **42**, 6335-6338(2009).
91. Effect of Molecular Weight of Homopolymer on Nanophase-Separated Structures of AB Block Copolymer/C Homopolymer Blends with Hydrogen Bonding interactions
K. Dobrosielska, S. Wakao, J. Suzuki, K. Noda, A. Takano, Y. Matsushita
Macromolecules **42**, 7098-7102(2009)
92. Phase Behavior of Poly(4-tert-butylstyrene-ran-4-tert-butoxystyrene)/ Polyisoprene Blends with Competitive Interactions

A. R., Siti Sarah, D.Kawaguchi, A. Takano, Y.Matsushita
J. Polym. Sci.,Polym. Phys.,Part B **47**, 2272-2280(2009)

93. Dimension of Ring Polymers in Bulk Studied by Monte-Carlo Simulation and Self-Consistent Theory
J. Suzuki,A.Takano, T. Deguchi, Y. Matsushita
J. Chem. Phys. **131**, 144902(2009)
94. Spontaneous Appearance of Microdomains of Two Components at Poly(4-*tert*-butylstyrene- *block*-4-*tert*-butoxystyrene) Film Surfaces
D. Kawaguchi, H. Nomura, Siti Sarah A.R., M. Nakayama, Y. Matsushita
Macromolecules **42**, 8992-8997(2009).
95. Creation of Hierarchical Nanophase-Separated Structures via Supramacromolecular Self-Assembly from Two Asymmetric BlockCopolymers with Short Interacting Sequences Giving Hydrogen Bonding Interaction
K. Dobrosielska, A. Takano, Y. Matsushita
Macromolecules **43**, 1101-1107(2010)
96. Preparation and Morphology Control of Block Copolymer/Metal Salt Hybrids via Solvent-Casting by Using a Solvent with Coordination Ability
A. Noro, Y. Sageshima, Y. Matsushita
Macromolecules **43**, 5358-5364(2010).
97. Formation of Undulated Lamellar Structure from ABC Block Terpolymer Blends with Different Chain Lengths.
Y.Matsushita, J. Suzuki, Y. Izumi, K. Matsuoka, S. Takahashi, Y. Aoyama, T. Mihira, and A. Takano
J.Chem.Phys. **133**, 194901(2010).
98. Monomer Sequence of Partially Hydrolyzed Poly(4-tert-butoxystyrene) and Morphology of Diblock Copolymers Composing This Polymer Sequence as One Block
A. R., Siti Sarah, D.Kawaguchi, Y.Matsushita
Polymer **52**, 164-171(2011).
99. Simple Preparation of Supramolecular Polymer Gels via Hydrogen Bonding by Blending Two Liquid Polymers
A. Noro, M. Hayashi, A. Ohshika, Y. Matsushita
Soft Matter **7**, 1667-1670(2011).
100. Microphase-separated Structures of Poly(4- tert-butylstyrene- block -4-tert-butoxystyrene) Upon Gradual Changes in Segregation Strength Through Hydrolysis Reaction
A. R. Siti Sarah; D. Kawaguchi, Y. Matsushita
Macromolecules **44**, 2799-2807(2011).
101. Nanophase-Separated Supramolecular Assemblies of Two Functionalized Polymers via Acid-Base Complexation
A.Noro, K. Ishihara, Y. Matsushita
Macromolecules **44**, 6241-6244(2011)
102. Precise Analyses of Short-Time Relaxation at Asymmetric Polystyrene Interface in Terms of Molecular Weight by Time-Resolved Neutron Reflectivity Measurements
D. Kawaguchi, A. Nelson, Y. Masubuchi, J. Majewski, N. Torikai, N. Yamada, A. R. Siti Sarah, A. Takano, Y. Matsushita

Macromolecules **44**, 9424-9433(2011)

103. The Theta-Temperature Depression Caused by Topological Effect in Ring Polymers Studied by Monte-Carlo Simulation
J. Suzuki, A. Takano, and Y. Matsushita
J. Chem. Phys. **135**, 204903(2011)

104. Creation and Control of New Morphologies via Supramacromolecular Self-Assembly
Yushu Matsushita, Atsushi Noro, and Atsushi Takano
Polym. J. **44**, 72–82(2012)

105. Radii of Gyration of Ring-Shaped Polystyrenes with High Purity in Dilute Solutions
A. Takano, Y. Ohta, K. Masuoka, K. Matsubara, T. Nakano, A. Hieno, M. Itakura, K. Takahashi,S. Kinugasa, D.Kawaguchi, Y. Takahashi, Y. Matsushita
Macromolecules **45**, 369-373(2012)

106. Design and Properties of Supramolecular Polymer Gels
A. Noro, M. Hayashi, Y. Matsushita
Soft Matter **8**, 2416-2419(2012)

107. Dielectric Behavior of Guest cis-Polyisoprene Confined in Spherical Microdomain of Triblock Copolymer.
Q. Chen, Y.Matsumiya, T. Iwamoto, K. Nishida, T. Kanaya, and H. Watanabe, A.Takano, K. Matsuoka, Y. Matsushita
Macromolecules, 45 (6), 2809–2819(2012)

108. Preparation and Characterization of Polyisoprenes and Polybutadienes Having 1,2- and 3,4-linkages Preferentially
A. Takano , T. Horaiya, F. Odamaki, Y. Akazawa, Y. Ohta, D.Kawaguchi, Y.Takahashi, Y. Matsushita
Polymer **53**, 3354-3359(2012)

109. Temperature and Molecular Weight Dependence of Mutual Diffusion Coefficient of Cyclic Polystyrene / Cyclic Deuterated Polystyrene Bilayer Films
D.Kawaguchi, Y. Ohta, A. Takano, Y. Matsushita
Macromolecules **45**, 6748-6752(2012)

110. Dielectric behavior of Styrene-Isoprene (SI) Diblock and SIIS Triblock Copolymers: Global Dynamics of I Blocks in Spherical and Cylindrical Domains Embedded in Glassy S Matrix
Y. Matsumiya, Q. Chen, A. Uno, H.Watanabe, A. Takano, K. Matsuoka, Y. Matsushita
Macromolecules **45**, 7050-7060(2012)

111. Preparation and Morphology of Hybrids Composed of a Block Copolymer and Semiconductor Nanoparticles via Hydrogen Bonding

A. Noro, K. Higuchi, Y. Sageshima, Y. Matsushita
Macromolecules **45**, 8013-8020(2012)

112. Fabrication and Modification of Ordered Nanoporous Structures from Nanophase-separated Hybrids of Block Copolymer/Metal Salt
Y. Sageshima, S. Arai, A.Noro, Y. Matsushita
Langmuir **28**, 17524-17529(2012)

113. Precise Synthesis and Characterization of Tadpole-Shaped Polystyrenes with High Purity
Y. Doi, Y. Ohta, A. Takano, Y. Matsushita
Macromolecules **46**, 1075-1081(2013)

114. SANS Study on Chain Dimension of Polystyrenes Diluted with Low Molecular-Weight Homologues in Semi-Dilute Solutions
N. Torikai, N. Takabayashi, J. Suzuki, I. Noda, Y. Matsushita
Polymer **54**, 929-934(2013)

115. Topological Constraint in Ring Polymers under Theta Condition Studied by Monte-Carlo Simulation
J. Suzuki, A. Takano, Y. Matsushita
J.Chem.Phys. **138**, 024902(2013)

116. Anisotropic Self-Assembly of Gold Nanoparticle Grafted with Polyisoprene and Polystyrene Having Symmetric Polymer Composition
T. Nakano, D. Kawaguchi, Y. Matsushita
J. Am. Chem. Soc. **135**, 6798(2013).

117. Thermoreversible Supramolecular Polymer Gels via Metal-Ligand Coordination in an Ionic Liquid
A. Noro, S. Matsushima, X. He, M. Hayashi,Y. Matsushita,
Macromolecules **46**, 8304-8310(2013).

118. Chain conformations of ring polymers under theta conditions studied by Monte Carlo simulation
J. Suzuki, A. Takano, Y. Matsushita
J. Chem. Phys. **139**, 184904(2013)

119. Structural Isomer Effects on the Morphology of Block Copolymer/Metal Salts Hybrids
Y. Sageshima, A. Noro, Y. Matsushita
J. Polym. Sci., Polym. Phys. **52**, 377-386(2014).

120. Formation of Tetragonally-Packed Rectangular Cylinders from ABC Block Terpolymer Blends
Y. Asai, K. Yamada, M.Yamada,A. Takano, Y. Matsushita,

ACS Macro Lett., **3**,166-169(2014)

121. Viscoelastic Properties of Supramolecular Soft Materials with Transient Polymer Network
M. Hayashi, A. Noro, Y. Matsushita,
J. Polym. Sci. Part B, Polym. Phys. Ed. **52**, 755–764(2014).

122. Photonic Block Copolymer Films Swollen with an Ionic Liquid
A. Noro, Y. Tomita, Y. Shinohara, Y. Sageshima, J. Walish, Y. Matsushita, E.L. Thomas
Macromolecules **47**, 4103-4109(2014).

123. Mechanical Property Enhancement of ABA Block Copolymer-Based Elastomers by Incorporating Transient Cross-Links into Soft Middle Block
M. Hayashi, S Matsushima, A. Noro, Y. Matsushita
Macromolecules **48**, 421-431(2015)

124. Interactions between Ring Polymers in Dilute Solution Studied by Monte Carlo Simulation
J. Suzuki, A. Takano, and Y. Matsushita
J. Chem. Phys. **142**, 044904(2015).

125. Creation of Cylindrical Morphologies with Extremely Large Oblong Unit Lattice from ABC Block Terpolymer Blends
Y. Asai, A. Takano, Y. Matsushita
Macromolecules **48**, 1538-1542(2015).

126. A Periodic Pattern with Five-Neighbored Domain Packing from ABC Triblock Terpolymer / B Homopolymer Blend
Y. Izumi, M. Yamada, A. Takano, Y. Matsushita
J. Polym. Sci., Part B, Polym. Phys. **53**, 907-911(2015).

127. Melt Rheology of Ring Polystyrenes with Ultra-High Purity
Y. Doi, K., Matsubara, Y. Ohta, T. Nakano, D. Kawaguchi, Y. Takahashi, A. Takano, Y. Matsushita
Macromolecules **48**, 3140-3147(2015).

128. Melt Rheology of Tadpole-Shaped Polystyrenes

Y. Doi, K., Y. Takahashi, A. Takano, Y. Matsushita

Macromolecules **48**, 8667-8674(2015).

129. Synthesis and Characterization of Comb-Shaped Ring Polystyrenes

Y. Doi, Y. Iwasa, K. Watanabe, M. Nakamura, A. Takano, Y.Takahashi, Y.Matsushita
Macromolecules **49**, 3109–3115(2016).

130. Asymmetric Double Tetragonal Domain Orientation from ABC Triblock Terpolymer Blends with Chain Length Difference"
Y. Asai, T. Takano, Y. Matsushita
Macromolecules, **49**, 6940-6946 (2016).

131. Morphology of Symmetric ABCD Tetrablock Quadropolymers Studied by Monte-Carlo Simulation
J.Suzuki, A. Takano, Y. Matsushita
J. Chem. Phys. **145**, 194905(2016).

132. Synthesis and Characterization of Dumbbell-Shaped Polystyrene
Y. Doi, A.Takano, Y. Matsushita
Polymer **106**, 8-13(2016)

133. Enthalpy-Driven Swelling of Photonic Block Polymer Films
A. Noro, Y. Tomita, Y. Matsushita, E. Thomas
Macromolecules **49**, 8971-8979(2016).

134. Kaleidoscopic Tiling Patterns with Large Unit Cells from ABC Star-Shaped Terpolymer / Diblock Copolymer Blends with Hydrogen Bonding Interaction."
H. Miyase, Y. Asai, A. Takano,Y. Matsushita

Macromolecules **50**, 979-986(2017)

135. Precise Synthesis of a Series of Poly(4-n-alkylstyrene)s and Their Glass Transition Temperatures

S. Matsushima,A.Takano,Y.Takahashi, Y. Matsushita

J. Polym. Sci., Part B, Polym. Phys. **55**, 757-763(2017)

136. Tricontinuous Double Diamond Network Structure from Binary Blends of ABC Triblock Terpolymers"
Y. Asai, J. Suzuki, Y. Aoyama, H. Nishioka, A. Takano, Y. Matsushita,
Macromolecules **50**, 5402-5411(2017).

137. Design and Properties of Supramolecular Elastomers

T. Kajita, A. Noro, Y. Matsushita
Polymer **128**, 297-310(2017).

138. Dynamic Viscoelasticity of a Series of Poly(4-n-alkylstyrene)s and Their Alkyl Chain Length Dependence
S. Matsushima, A. Takano, Y. Takahashi, Y. Matsushita
J. Polym. Sci., Part B: Polym. Phys., ***55***, 1791-1797 (2017).

139. Alkyl Side Chain Length Dependent Compatibility of Poly(4-n-alkylstyrene)s and 1,4-rich Polyisoprene Blends
S. Matsushima, A. Takano, Y. Takahashi, Y. Matsushita
Polymer **133**, 137-142(2017).

140. Conformations of Ring Polystyrenes in Bulk Studied by SANS"
T. Iwamoto,Y. Doi, Yuya, K.Kinoshita, Y. Ohta, A. Takano, Y. Takahashi, M. Nagao, Y. Matsushita
Macromolecules **51**, 1539-1548(2018)

141. SANS Study of Ring Topology Effects on the Miscibility of Polymer Blends
Y. Kobayashi,Y. Doi, A. R. Siti Sarah, E. Kim,T. T.-H. Kim, A. Takano, Y. Matsushita
Macromolecules **51(5)**, 1885-1893(2018).

142. Thin Films with Perpendicular Tetragonally-Packed Rectangular Rods Obtained from Blends of Linear ABC Block Terpolymers.
Aynur Guliyeva,; Marylene Vayer,; Fabienne Warmont, Anne Marie Faugère, Pascal Andreazza, Atsushi Takano, Yushu Matsushita, Christophe Sinturel,
ACS Macro Lett., **7**, 789-794(2018).

143. Conformations of Ring Polystyrenes in Semi-Dilute Solutions and in Linear Polymer Matrices Studied by SANS
T. Iwamoto, Y. Doi, K. Kinoshita, A. Takano, Y. Takahashi, E. Kim, T -H Kim, S. Takata, M. Nagao, Y. Matsushita
Macromolecules, **51(17)**, 6836-6847(2018).

144. Dimensions of Catenated Ring Polymers in Dilute Solution Studied by Monte-Carlo Simulation
Jiro Suzuki, Atsushi Takano, Yushu Matsushita
J. Chem. Phys., **149**, 204901(2018).

145. Preparation and Morphologies of AB_6- Block-Graft Copolymers
M. Watanabe, Y.Asai, A. Takano, Y. Matsushita
J. Polym. Sci., Part B: Polym. Phys.. **57**, 952-960(2019)

146. Acidic Liquid-Swollen Polymer Membranes Exhibiting Anhydrous Proton Conductivity Higher than 100 mS/cm at Around 100 °C
T. Kajita, H. Tanaka, A.Noro, Y. Matsushita, N. Nakamura
J. Mater. Chem. A **7**, 15585(2019).

147. Bicontinuous Double-Diamond Structures Formed in Ternary Blends of AB Diblock Copolymers with Chains of Different Lengths
W.Takagi , J. Suzuki, Y. Aoyama, T. Mihira, A. Takano,Y. Matsushita
Macromolecules, **52**, 6633-6640(2019)

148. Transition Pathway Between Gyroid and Cylindrical Morphology in Linear Triblock Terpolymer Thin Films
A. Guliyeva, M. Vayer,; F. Warmont, A-M. Faugère, P. Andreazza, A.Takano, Y.Matsushita, C. Sinturel,
Macromolecules, **52**, 6641-6648(2019)

149. Periodic and Aperiodic Tiling Patterns from Tetrablock Terpolymer System of the A_1BA_2C type
Y. Miyamori, J. Suzuki, A. Takano, Y. Matsushita
ACS Macro Letters, **9**, 32-37(2020).

150. Non-Classical Block-Copolymer Self-Assembly Resulting from a Constrained Location of Chains and Junctions" (Invited Review, No. admi.201902007R1)
Y. Matsushita, A. Takano, M. Vayer, C. Sinturel
Adv. Mat. Interfaces, 1902007(2020).

他　７３編

２　総説など

１「ミクロ相分離構造中の高分子鎖の分子形態」
　野田一郎、松下裕秀　「高分子加工」39 巻, 489(1990).
２「ABC 型三元ブロック共重合体のミクロ相分離構造」
　野田一郎、松下裕秀、茂木靖浩
「ポリマーダイジェスト」46 巻 11 号, 17-31(1994).
３「高分子が自発的に作る秩序」
　野田一郎、松下裕秀　「現代化学」291 号, 12-18(1995).
４「ブロック共重合体およびその混合系の凝集平衡パターン」
　松下裕秀　「高分子」45 巻, 746-750(1996).
５「高分子凝集系の平衡ナノパターン」
　松下裕秀　「表面」34 巻 12 号, 749-753(1996).
６「講座：中性子ビーム利用」　Ｖ　中性子小角散乱　１　小角散乱の基礎」
松下裕秀　「RADIOISOTOPES」46 巻 3 号, 180-185(1997).

７「ブロック共重合体の組成に伴うモルフォロジー転移　― 共連続構造とその安定性」
　松下裕秀　「日本ゴム協会誌」71 巻 4 号, 195-200(1998).
８「中性子反射率法によるブロック共重合体のミクロ相分離界面の研究」
　鳥飼直也、松下裕秀　「繊維学会誌」54 巻 12 号, 423-427(1998).
９「中性子散乱によるソフトマター の研究動向　―現状と将来」
　　松下裕秀「化学と工業」52 巻 1 号, 25-27(1999).
１０「中性子散乱―産業への応用」
　　森井幸生、松下裕秀
『中性子科学』　日本原子力産業会議編 B. NSA/COMMENTARIES: NO.7, 77-88(1999)
１１「共重合体がつくる秩序構造を利用した材料設計」
松下裕秀、高野敦志　「未来材料」　2 巻 7 号, 13-19(2002)
１２「ABC 星型共重合体のミクロ相分離構造解析」
高野篤志、松下裕秀　「高分子加工」53 巻 5 号, 216-220(2004).
１３「テトラブロック共重合体を用いた非線形光学材料の設計」
松下裕秀、高野敦志　「機能材料」24 巻 5 号, 30-35(2004)
１４「展望　ミクロ相分離構造」　松下裕秀、高野敦志
「高分子」 Vol.53, No9, 719-721(2004).
１５「数学と高分子　高分子と対称性」　－共連続立方相とアルキメデスタイリング　松下裕秀、堂寺知成 「高分子」57 巻 2 号, 71-75(2008).
１６　「複合高分子の自己組織化　－アモルファス物質が作るメソスコピック結晶　（Ｉ）構造構築の基本と二元、三元線状ブロック共重合体」　松下裕秀「まてりあ」　48 巻, 16-19(2009).
１７　「高分子/高分子界面における分子鎖の拡散」
川口大輔、松下裕秀　「波紋」　19 巻, 101-104(2009)
１８「超分子性相互作用を取り入れた高分子複合体の自己組織化」
　松下裕秀、野呂篤史　　「高分子」　63 巻、237-241 (2014)
１９「複合高分子の自発構造　－アルキメデスタイリングと準結晶タイリング」
松下裕秀　「化学」70 巻(9), 68-69(2015)
２０「複合高分子の新分子設計が生む新秩序パターン」
松下裕秀、高野敦志、浅井裕介 「放射光」21 巻、182-186(2017)

他　１３編

　３　著書

１　基礎化学コース　高分子化学 II　物性　松下裕秀　丸善　１９９６
２　新高分子実験学　６巻、３章２　中性子弾性散乱
野田一郎、松下裕秀、今井正幸（共著）高分子学会編　共立出版１９９７
３　"Structures and Properties of Multi-Phase Polymeric Materials"
Chap. 4 Block and Graft Copolymers, T. Araki, Q. Tran-Cong,
M. Shibayama Eds, Marcel Dekker, pp121 - 154, 1998.
４　結晶解析ハンドブック　第４編　1-6　反射率計
松下裕秀、目時直人（共著）　原田仁平ら編　共立出版　１９９９
５　物理学辞典３訂版　「中性子反射率計」他
菊田惺志ら編　培風館　2005
６　第３版　高分子辞典　「ギニエ近似」他　共著　高分子学会編
朝倉書店　2005
７　第 5 版実験化学講座　高分子物性実験序論　共著　丸善　2005
８ 基礎高分子科学　「小角 X 線散乱、小角中性子散乱」共著　高分子学会編　東京化学同人　2006
９「高分子の構造と物性」（編著）　講談社　2013
１０　Encyclopedia of Polymeric Nanomaterials, Block Copolymers, Microphse-Separation, Springer

他 6 編