

表 1-1

Core Size (nm)	Ligand	λ_{em} (λ_{ex})	Assignment	Ref.
0.8(Au ₁₂)	DMSA ^c	630 nm(395 nm)	T ₁ → S ₀	(18)
0.8 ^a	Dodecanethiol	840 nm(680 nm)	-----	(23)
0.9(Au ₂₈) ^b	GSH ^d	830 nm(500 nm)	sp → d	(19)
		1080 nm(514 nm)	sp → sp	
1.1(Au ₃₈) ^b	Dodecanethiol	1200 nm(1064 nm)	sp → sp	(24)
1.7(Au ₁₄₇) ^b	Dodecanethiol	1200 nm(1064 nm)	sp → sp	(24)
1.8 ^a	Tiopronin ^e	770 nm(451nm)	sp → d	(25)

a. Core size was determined by TEM measurements.

b. Clusters were purified and their core size were determined by MASS.

c. DMSA : meso-2,3-dimercaptosuccinic acid

d. GSH : Glutathione

e. Tiopronin : N-2-mercaptosuccinic acid

資料來源：Chemical Physics Letter ,2004, 383, 161

表 1-2 常見於塊式高分子鏈段的化學結構

$\left[\begin{array}{c} \text{C}=\text{CHCH}_2\text{CH}_2 \\ \\ \text{CH}_3 \end{array} \right]_n$	poly(isoprene)	PI	$\left[\begin{array}{c} \text{CHCH}_2 \\ \\ \text{COOH} \end{array} \right]_n$	poly(acrylic acid)	PAA
$\left[\text{CH}=\text{CHCH}_2\text{CH}_2 \right]_n$	poly(butadiene)	PB	$\left[\begin{array}{c} \text{CHCH}_2 \\ \\ \text{C}_5\text{H}_4\text{N} \end{array} \right]_n$	poly(2-vinylpyridine)	P2VP
$\left[\begin{array}{c} \text{CHCH}_2 \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_n$	poly(styrene)	PS	$\left[\begin{array}{c} \text{CHCH}_2 \\ \\ \text{C}_4\text{H}_4\text{N} \end{array} \right]_n$	poly(4-vinylpyridine)	P4VP
$\left[\text{CH}_2\text{CH}_2 \right]_n$	poly(ethylene)	PE	$\left[\text{OCH}_2\text{CH}_2 \right]_n$	poly(ethylene oxide) poly(oxyethylene)	PEO
$\left[\begin{array}{c} \text{CHCH}_2 \\ \\ \text{CH}_2 \\ \\ \text{CH}_3 \end{array} \right]_n$	poly(ethyl ethylene)	PEE	$\left[\begin{array}{c} \text{OCH}_2\text{CH} \\ \\ \text{CH}_3 \end{array} \right]_n$	poly(propylene oxide) poly(oxypropylene)	PPO
$\left[\begin{array}{c} \text{CH}_2\text{CHCH}_2\text{CH}_2 \\ \\ \text{CH}_3 \end{array} \right]_n$	poly(ethylene-propylene)	PEP	$\left[\begin{array}{c} \text{OCH}_2\text{CH} \\ \\ \text{CH}_2 \\ \\ \text{CH}_3 \end{array} \right]_n$	poly(butylene oxide) poly(oxybutylene)	PBO
$\left[\begin{array}{c} \text{CHCH}_2 \\ \\ \text{C}_6\text{H}_{11} \end{array} \right]_n$	poly(vinylcyclohexane)	PVCH	$\left[\begin{array}{c} \text{C}(\text{CH}_2)_5\text{NH} \\ \\ \text{O} \end{array} \right]_n$	nylon 6 poly(ϵ -caprolactam)	nylon 6
$\left[\begin{array}{c} \text{CCH}_2 \\ \\ \text{COOCH}_3 \end{array} \right]_n$	poly(methyl methacrylate)	PMMA	$\left[\begin{array}{c} \text{C}(\text{CH}_2)_5\text{O} \\ \\ \text{O} \end{array} \right]_n$	poly(ϵ -caprolactone)	PCL
$\left[\begin{array}{c} \text{CCH}_2 \\ \\ \text{COOH} \end{array} \right]_n$	poly(methacrylic acid)	PMA	$\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{SiO} \\ \\ \text{CH}_3 \end{array} \right]_n$	poly(dimethylsiloxane)	PDMS

資料來源：The Physics of Block Copolymer⁽²⁶⁾

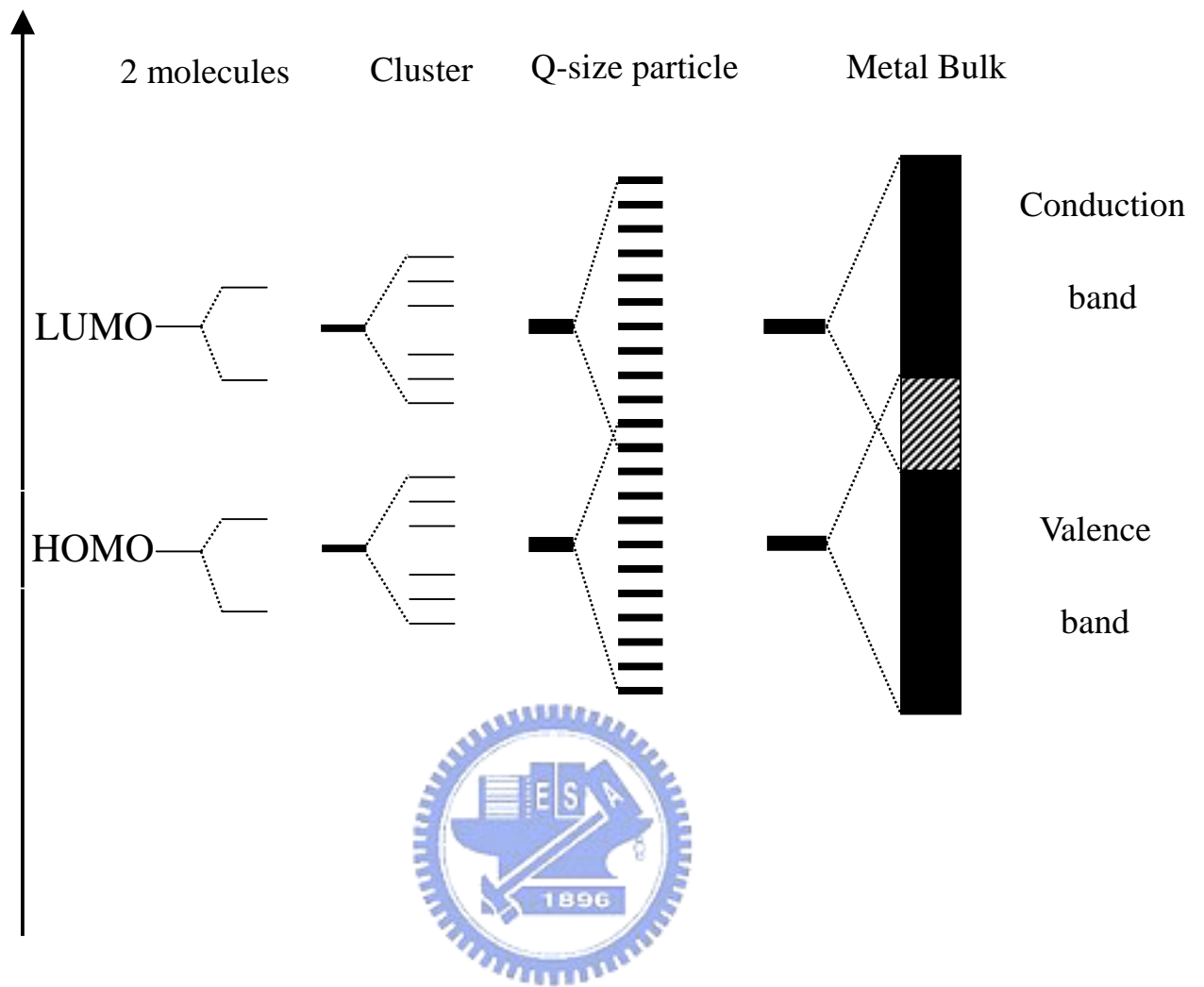


圖 1-1 金屬塊材能階量子化示意圖

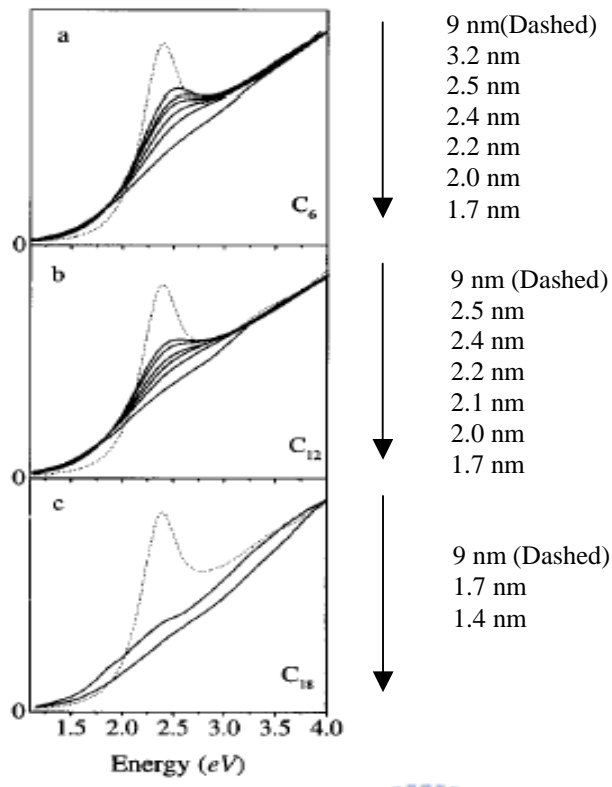


圖 1-2 以(a)以 C₆-SH、(b)C₁₂-SH、(c)C₁₈-SH，做為表面改質劑的金奈米粒子的光吸收圖譜與尺寸的關係⁽¹⁰⁾。

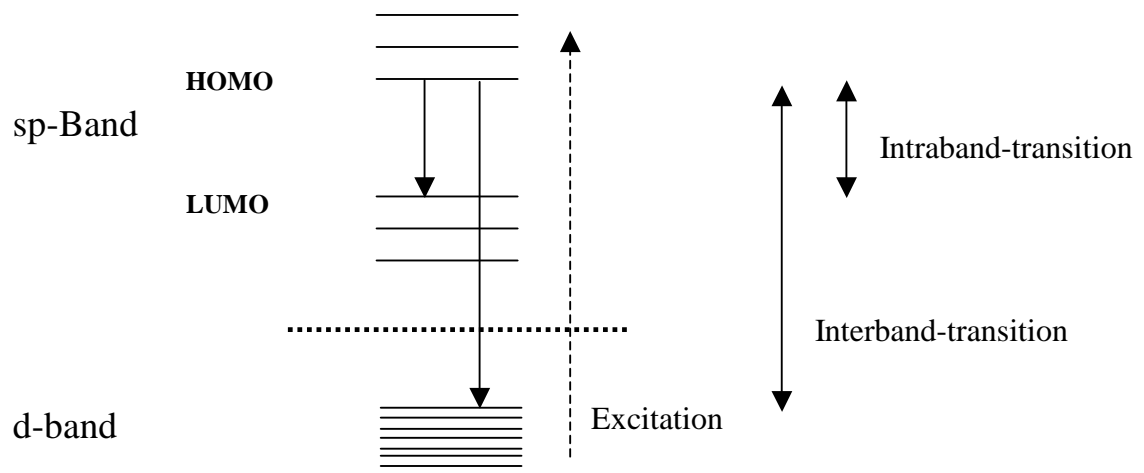
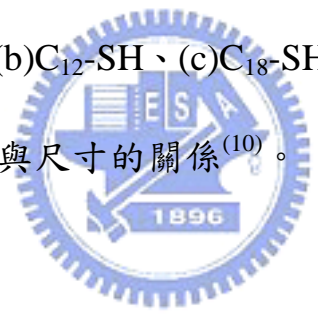


圖 1-3 金原子團簇中 $sp \rightarrow sp$ (Intraband)及 $sp \rightarrow d$ (Interband)之間的電子躍遷的示意圖⁽¹⁹⁾

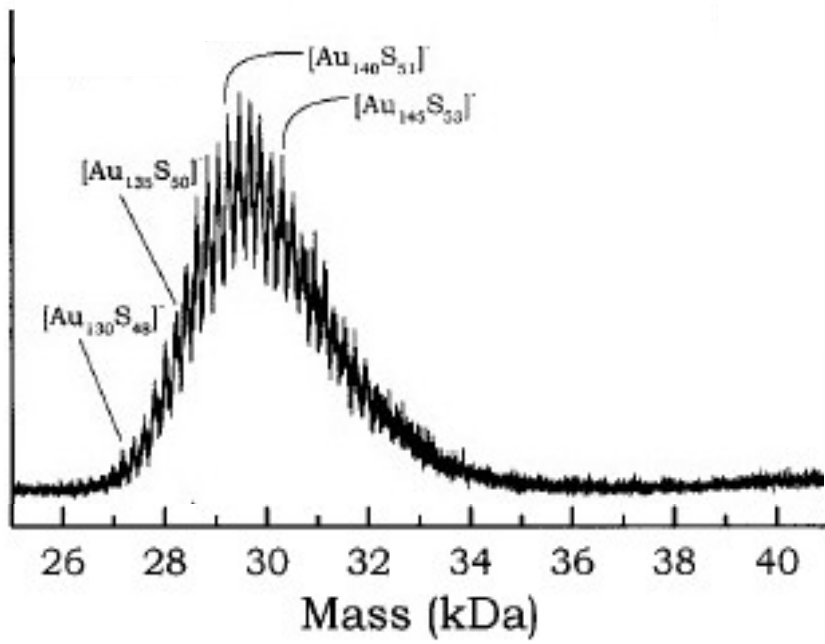


圖 1-4 以 Dodecanethiol 為表面改質劑， $m/z=29000$ 左右的 Au MPC 的 LDI

質譜圖⁽²¹⁾

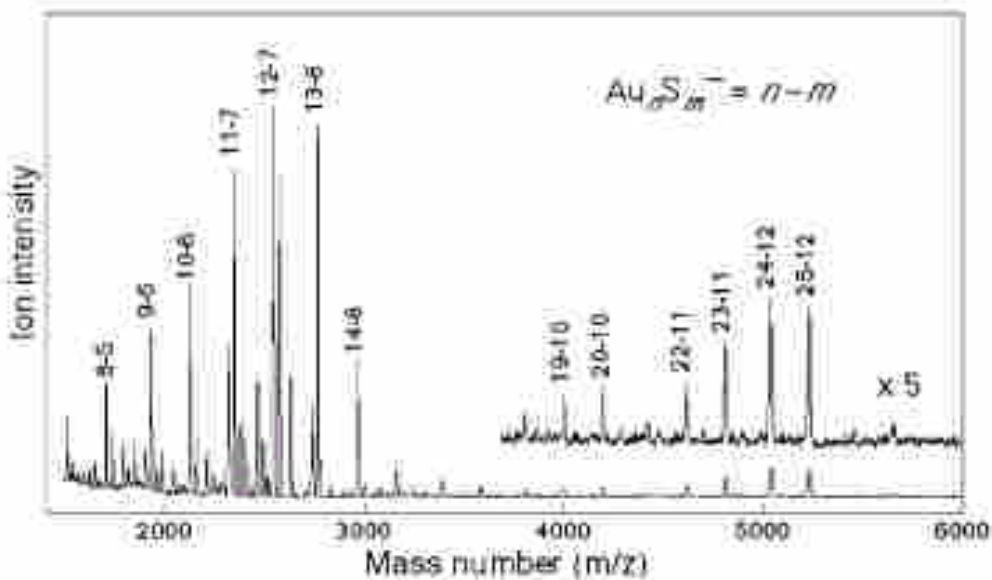


圖 1-5 以 DMSA 為表面改質劑的 Au MPC 的 LDI 質譜⁽²²⁾

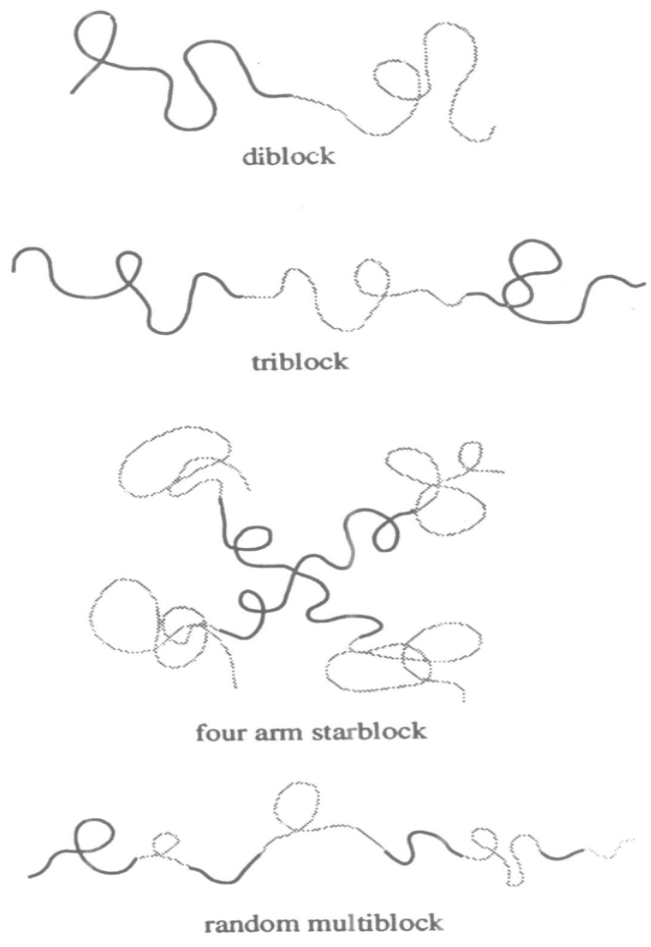


圖 1-6 四種常見的塊式高分子結構

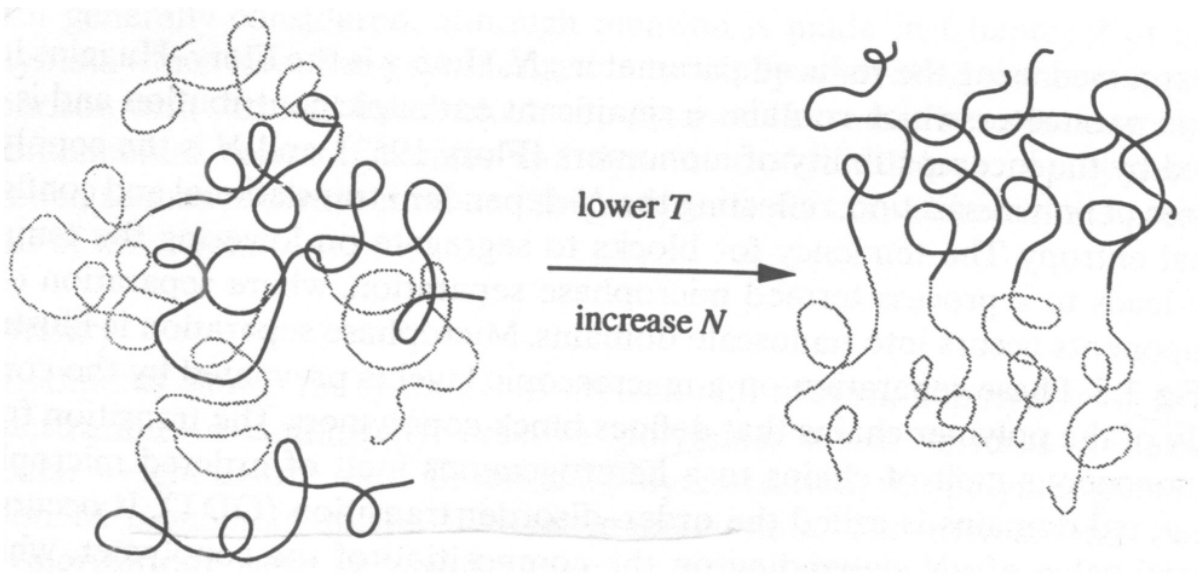


圖 1-7 融熔態塊狀高分子微相分離的示意圖

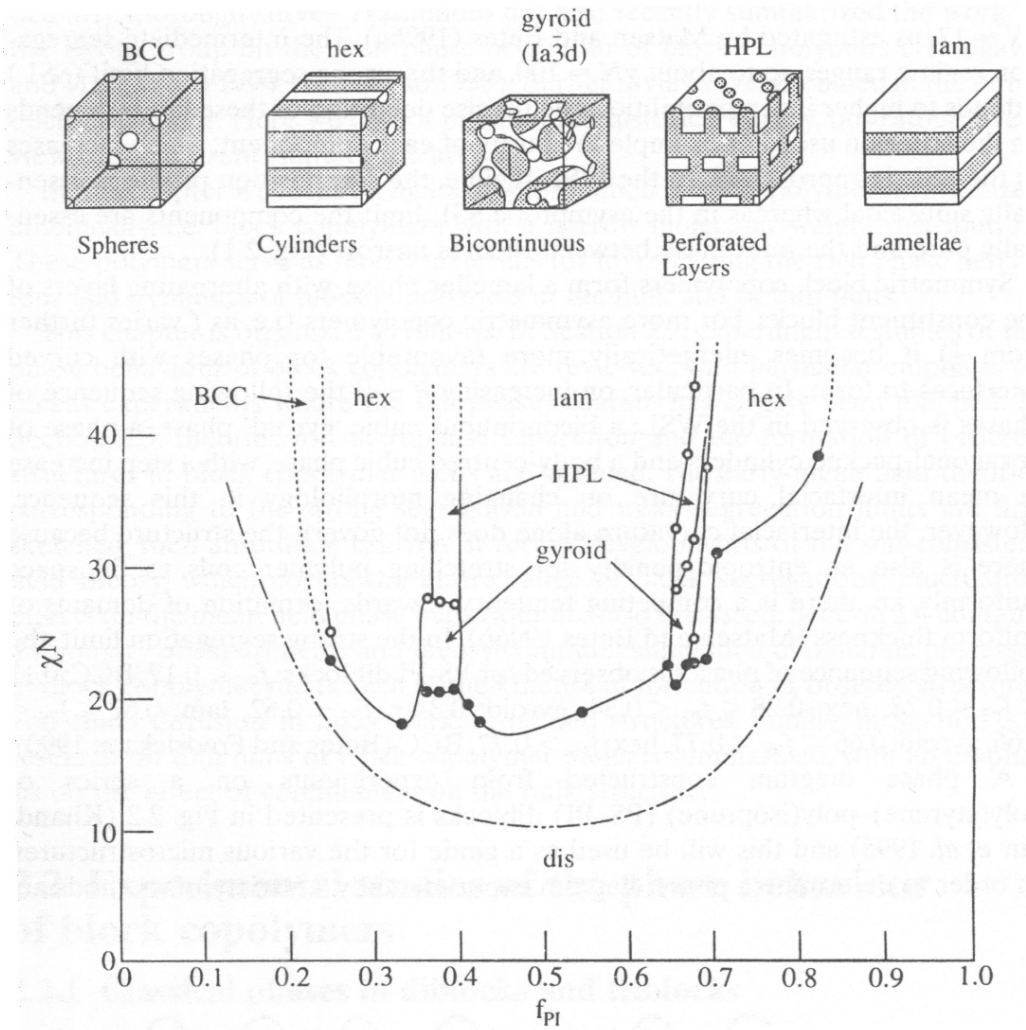


圖 1-8 PS-PI 雙塊式高分子的相圖(Phase Diagram)

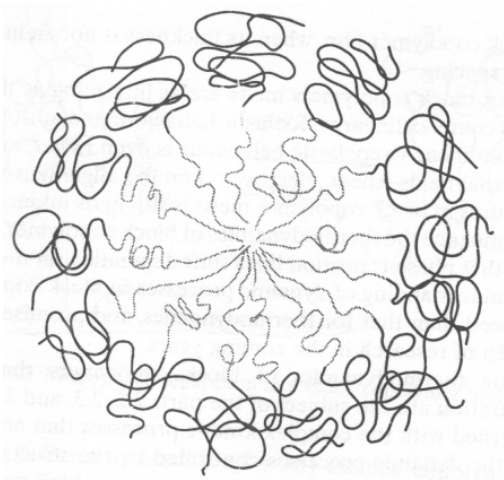


圖 1-9 雙塊式高分子微胞的示意圖

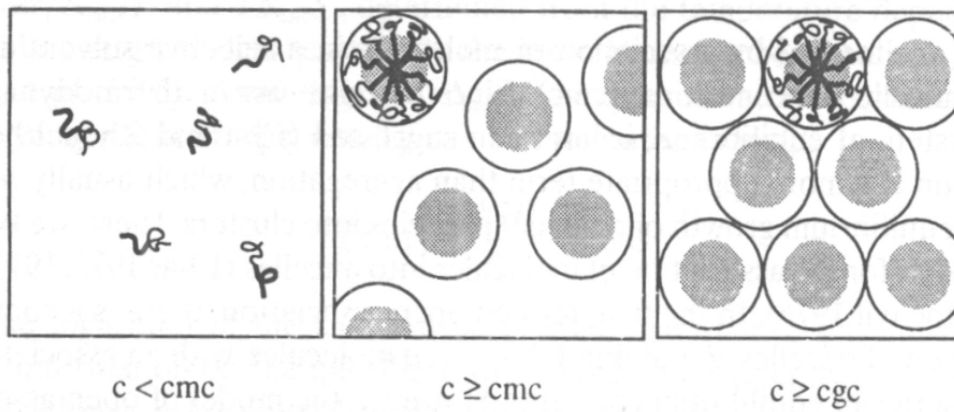


圖 1-10 塊狀高分子溶液中，微胞及凝膠的形成與濃度之間的關係



註：圖 1-6 到圖 1-10 皆取自 The Physics of Block Copolymer⁽²⁶⁾

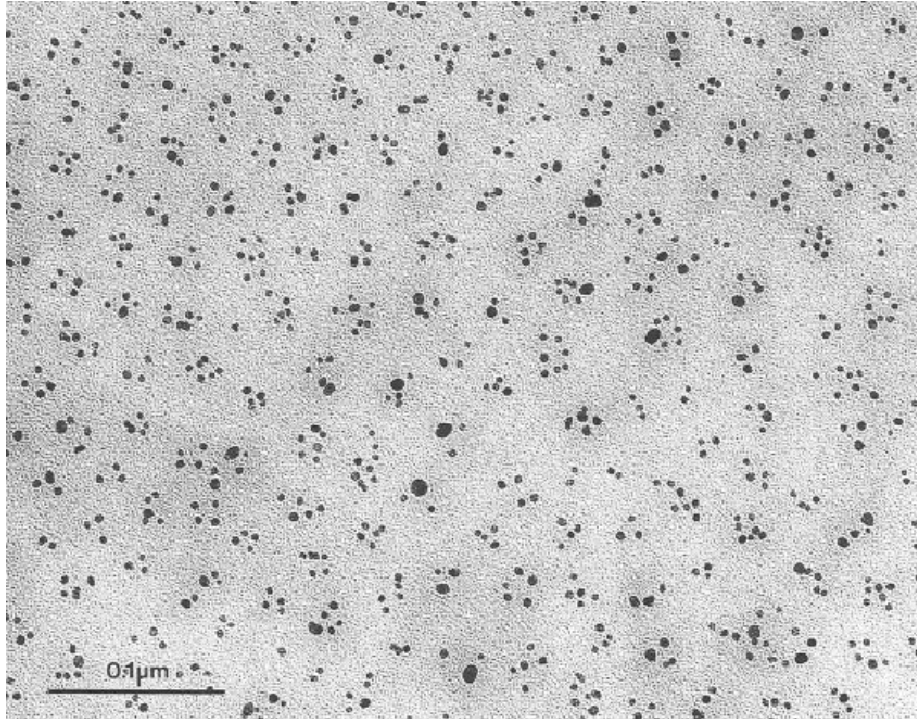


圖 1-11 在 PS-P4VP 微胞中合成出的鉑(Pd)奈米粒子⁽²⁹⁾

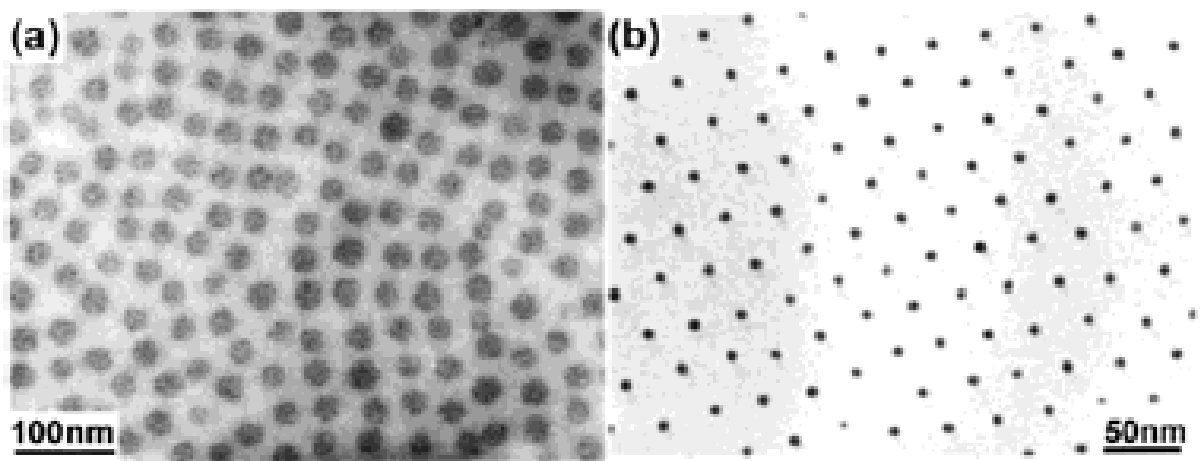


圖 1-12 (a)PS-P2VP 微胞溶液加入 HAuCl_4 、(b)為加入 N_2H_4 還原溶液(a)中

P2VP 相內的金離子，得到金奈米粒子的 TEM 照片

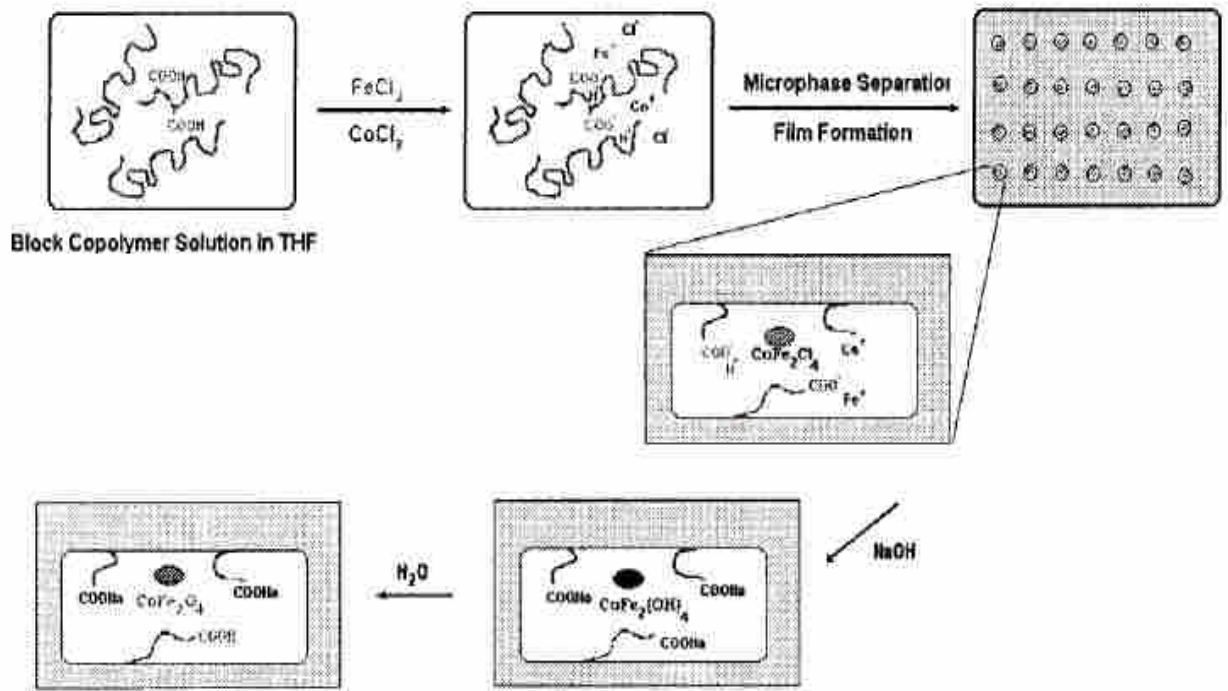


圖 1-13 在 NOR-b-NORCOOH 薄膜的 NORCOOH 相當中合成 CoFe_2O_4 奈米粒子的流程圖⁽³⁰⁾



圖 1-14 以 PS-b-PFS 做為模版所製備的鈷(Co)奈米點陣列的 SEM 圖⁽³³⁾