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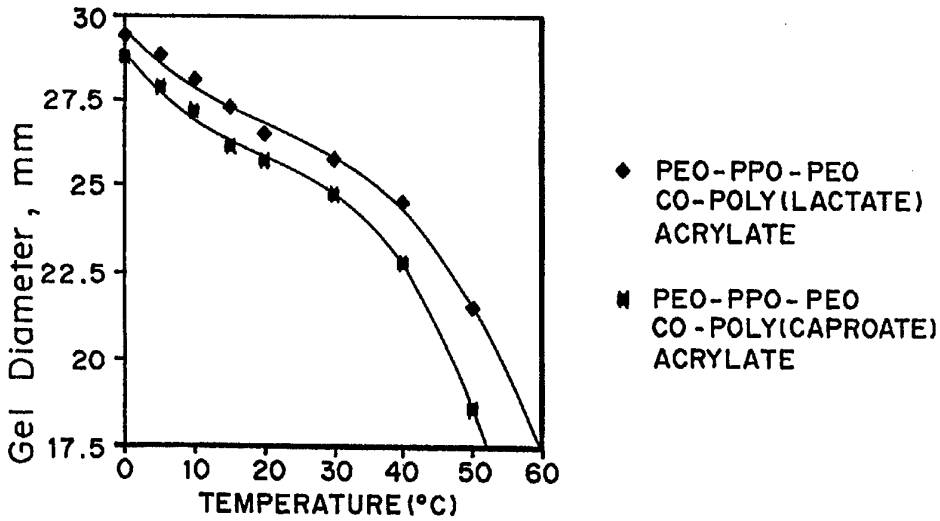

(57) Abstract

Gel-forming macromers including at least four polymeric blocks, at least two of which are hydrophobic and at least one of which is hydrophilic, and including a cross-linkable group are provided. The macromers can be covalently cross-linked to form a gel on a tissue surface *in vivo*. The gels formed from the macromers have a combination of properties including thermosensitivity and lipophilicity, and are useful in a variety of medical applications including drug delivery and tissue coating.

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INTERNATIONAL SEARCH REPORT

Int' onal Application No
PCT/US 96/12285

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C08G63/664 C08G65/32 A61K9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C08G A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,5 410 016 (HUBBELL A.J. ET AL) 25 April 1995 cited in the application see claims 1,3,11,13,14,19-23 see column 33, line 1 see column 5, line 15 - line 41 see column 5, line 42 - line 64 see figure 1 Structures E,I ---	1-50
X	EP,A,0 108 933 (AMERICAN CYANAMID CO.) 23 May 1984 see claims 1,3,9,10 see page 3, line 29 - line 30 --- -/--	1-3, 6-10, 16-18, 32,33, 38,39

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
17 December 1996	07.02.97
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer O'Sullivan, T

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,15 95 369 (BASF AG.) 9 April 1970 see claims 1,2 see page 2, line 10-14 ---	1,3,7, 15-17,19
A	EP,A,0 552 802 (EASTMAN KODAK AG.) 28 July 1993 see table 1 see claims 1,3-7,9 ---	1-50
A	US,A,4 716 203 (CASEY D.J. ET AL) 29 December 1987 cited in the application see example 29 -----	1-50

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.ernational application No.

PCT/US 96/ 12285

INTERNATIONAL SEARCH REPORT

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [X] Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

Remark: Although claims 32-37 are directed to a method of treatment/ diagnosis of the human or animal body, a search has been carried out, based on the alleged effects of the compound/composition.
See Rule 39.1(iv) PCT

2. [ ] Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. [ ] Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. [ ] As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. [ ] As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest.

[ ] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int onal Application No
PCT/US 96/12285

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-5410016	25-04-95	US-A-	5380536	10-01-95
		US-A-	5468505	21-11-95
		US-A-	5567435	22-10-96
		AU-B-	673160	31-10-96
		AU-A-	3780993	13-09-93
		CA-A-	2117584	02-09-93
		CA-A-	2117588	16-09-93
		EP-A-	0627911	14-12-94
		EP-A-	0627912	14-12-94
		JP-T-	7506961	03-08-95
		JP-T-	7507056	03-08-95
		NZ-A-	249770	25-09-96
		NZ-A-	251039	26-03-96
		WO-A-	9317669	16-09-93
		WO-A-	9316687	02-09-93
		US-A-	5529914	25-06-96
		AU-A-	8755791	20-05-92
		EP-A-	0553195	04-08-93
		WO-A-	9206678	30-04-92
		US-A-	5462990	31-10-95
		US-A-	5567440	22-10-96
		US-A-	5232984	03-08-93
EP-A-0108933	23-05-84	US-A-	4452973	05-06-84
		CA-A-	1213089	21-10-86
		JP-C-	1773283	14-07-93
		JP-B-	4061890	02-10-92
		JP-A-	59100130	09-06-84
DE-A-1595369	09-04-70	BE-A-	707741	10-06-68
		FR-A-	1557086	14-02-69
EP-A-0552802	28-07-93	CA-A-	2087125	24-07-93
		JP-A-	5295120	09-11-93
		US-A-	5429826	04-07-95
US-A-4716203	29-12-87	AU-B-	605172	10-01-91
		AU-A-	7797087	10-03-88
		CA-A-	1283988	07-05-91
		DE-A-	3786309	29-07-93

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.nformation on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4716203		DE-T- 3786309	10-02-94
		EP-A- 0258780	09-03-88
		ES-T- 2058081	01-11-94
		JP-A- 63118326	23-05-88

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