

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 September 2001 (07.09.2001)

PCT

(10) International Publication Number
WO 01/64164 A3

(51) International Patent Classification⁷: **A61K 49/00**,
38/00

(21) International Application Number: PCT/US01/06455

(22) International Filing Date: 28 February 2001 (28.02.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/185,282 28 February 2000 (28.02.2000) US

(71) Applicant (*for all designated States except US*): **GENE-
SEGUES, INC.** [US/US]; 3180 High Point Drive, Chaska,
MN 55318 (US).

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **UNGER, Gretchen,
M.** [US/US]; 3180 High Point Drive, Chaska, MN 55318
(US).

(74) Agent: **SAWICKI, Z., Peter**; Kinney & Lange, P.A., Kin-
ney & Lange Building, 312 South Third Street, Minneapo-
lis, MN 55415-1002 (US).

(81) Designated States (*national*): AE, AL, AM, AT, AU, AZ,
BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,
EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN,
IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU,
SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US,
UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(88) Date of publication of the international search report:
20 December 2001

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: NANOCAPSULE ENCAPSULATION SYSTEM AND METHOD

(57) Abstract: The present invention generally relates to nanocapsules and methods of preparing these nanocapsules. The present invention includes a method of forming a surfactant micelle and dispersing the surfactant micelle into an aqueous composition having a hydrophilic polymer to form a stabilized dispersion of surfactant micelles. The method further includes mechanically forming droplets of the stabilized dispersion of surfactant micelles, precipitating the hydrophilic polymer to form precipitated nanocapsules, incubating the nanocapsules to reduce a diameter of the nanocapsules, and filtering or centrifuging the nanocapsules.



WO 01/64164 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/06455

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61K 49/00, 38/00

US CL : 424/450, 401, 400; 427/2.1, 2.24, 2.3

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)

U.S. : 424/450, 401, 400; 427/2.1, 2.24, 2.3

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 practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,736,156 A (BURKE) 07 April 1998, abstract, col. 2, lines 3-11, col. 5, line 68, examples 2 and 4.	1-33 and 38
Y	US 4,920,016 A (ALLEN et al.) 24 April 1990, abstract, col.2, line 13, col. 7, line 18, col. 8, lines 28-53.	1-33 and 38.
Y	US 5,985,832 A (ROODMAN et al.) 16 November 1999, abstract, col. 13, lines 25-50, col. 31, lines 55-60, col. 32, lines 25-45.	1-33 and 38.
Y, P	US 6,033,645 A (UNGER et al.) 07 March 2000, abstract, col. 6, lines 3-9, col. 8, lines 6-12, col. 7, lines 36-50, col. 19, line 17, col. 20, lines 30-45, col. 26, lines 3-30.	1-33 and 38.

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

05 MAY 2001

Date of mailing of the international search report

31 MAY 2001

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

JENNIFER L. KOLB

Telephone No. (703) 308-1495

Jean Proctor
Paralegal Specialist

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/06455

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,937,119 A (NIKLES et al.) 26 June 1990, abstract, col. 4, lines 35-42, col. 6, lines 36-65.	1-33 and 38.
Y	US 5,516,507 A (N'GUYEN et al.) 14 May 1996, col. 4, lines 1-18.	1-2.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/06455

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

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

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

Please See Extra Sheet.

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 searched 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.:
1-33 and 38

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

International application No.

PCT/US01/06455

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-33 and 38, drawn to methods of forming dispersions of micelles and nanocapsules.

Group II, claim(s) 34-37 and 39, drawn to transducing and administering genetic material.

Group III, claim(s) 40-41, drawn to a method of forming a nanocapsule matrix using a binder and excipient.

The inventions listed as Groups I, II, and III do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I is directed to a method of forming nanocapsules or dispersions of micelles using surfactants and hydrophilic polymer coatings. Groups II and III lack this special technical feature. Group II is directed to a method of transducing and administering genetic material by releasing polynucleotides into cells. Groups I and III lack this special technical feature. Group III is directed to a method of forming a nanocapsule matrix using a binder and excipient. Groups I and II lack this special technical feature.