(54) Title: MICROCAPSULES HAVING IMPROVED PRINTING AND EFFICIENCY

(57) Abstract: Dual shell microcapsule aggregate particles and copy materials coated therewith, such aggregate particles having inner shells surrounding chromogenic nucleus material, and outer shells encompassing multiple such inner shells to form aggregate particles thereof. The inner shells are derived from polar pre-polymer compositions. The outer shells are derived from complex colloids such as gelatin and gelatin derivatives. The outer shell material causes agglomeration of the inner shells into aggregate particles, thus increasing the sizes of the particles without increasing the sizes of the respective inner-shell microcapsules which contain the chromogenic material.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

| IPC(7) | B41M 5/20; B01B 15/08 |
| US CL. | Please See Extra Sheet. |

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. | 508/202, 206, 207, 214, 215, 218; 428/402.2, 402.21, 403 |

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)

EAST

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 4,087,376 A (FORIS et al) 02 May 1978, cols. 1-16</td>
<td>1-26</td>
</tr>
<tr>
<td>A</td>
<td>US 4,325,520 A (SHIOI et al) 25 June 1985, cols. 1-20</td>
<td>1-26</td>
</tr>
</tbody>
</table>

| * | Special categories of cited documents: |
| **A** | document defining the general state of the art which is not considered to be of particular relevance |
| **E** | earlier document published on or after the international filing date |
| **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) |
| **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 |

"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 |

"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 |

"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, each combination being obvious to a person skilled in the art |

"A" | document member of the same family |

Date of the actual completion of the international search: 12 MARCH 2003

Date of mailing of the international search report: 16 MAR 2003

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks

Box PCT

Washington, D.C. 20231

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Authorized officer: SAMUEL A. ACQUAH

Telephone No. (703) 306-1235

Form PCT/ISA/910 (second sheet) (July 1998)
### Box I  Observations where certain claims were found unsearable (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:

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.:

**Remark on Protest**

□ The additional search fees were accompanied by the applicant's protest.
□ No protest accompanied the payment of additional search fees.
A. CLASSIFICATION OF SUBJECT MATTER:
US CL :
503/202, 205, 207, 216, 215, 218; 428/402.2, 402.21, 403; 267/4.1, 4.3, 4.32, 4.33