US007150883B2

(12) **United States Patent**
Keller et al.

(10) **Patent No.: US 7,150,883 B2**
(45) **Date of Patent: *Dec. 19, 2006**

(54) **SELF FORMING, THERMODYNAMICALLY STABLE LIPOSOMES AND THEIR APPLICATIONS**

(75) Inventors: **Brian Charles Keller**, Antioch, CA (US); **Dan D. Lasic**, deceased, late of Fremont, CA (US); by **Alenka Lasic**, legal representative, Fremont, CA (US)

(73) Assignee: **BioZone Laboratories, Inc.**, Pittsburg, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/178,001**

(22) Filed: **Jul. 8, 2005**

(65) **Prior Publication Data**

US 2005/0249797 A1 Nov. 10, 2005

Related U.S. Application Data

(63) Continuation of application No. 10/262,284, filed on Sep. 30, 2002, now Pat. No. 6,958,160, which is a continuation of application No. 09/745,292, filed on Dec. 20, 2000, now Pat. No. 6,610,322.

(51) **Int. Cl.**
A61K 9/127 (2006.01)

(52) **U.S. Cl.** **424/450**; 428/402.2

(58) **Field of Classification Search** 424/450, 424/1.21, 9.321, 9.51, 417
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,225,212 A 7/1993 Martin et al.
5,358,714 A * 10/1994 Green 424/400
5,415,869 A * 5/1995 Straubinger et al. 424/450
5,720,973 A 2/1998 Rosenberg et al.
5,741,515 A 4/1998 Ciceri et al.
5,807,573 A * 9/1998 Ljusberg-Wahren et al. 424/450
5,859,228 A 1/1999 Janjic et al.
5,912,272 A 6/1999 Hoppe et al.
6,110,492 A * 8/2000 Alving et al. 424/450
6,610,322 B1 * 8/2003 Keller et al. 424/450
6,734,171 B1 * 5/2004 Saravolac et al. 514/44
6,958,160 B1 * 10/2005 Keller et al. 424/450

FOREIGN PATENT DOCUMENTS

EP	0 211 647	8/1985
EP	0 707 847	10/1994
JP	2000247868	9/2000
WO	94/19019	2/1993

OTHER PUBLICATIONS

International Search Report, BIOZ-0001PCT, International Application PCT/US 01/50118, mailed Nov. 7, 2002.

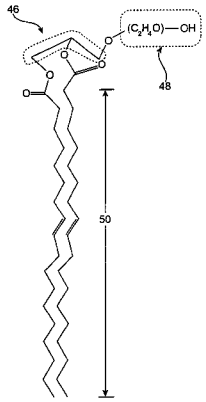
* cited by examiner

Primary Examiner—Gollamudi S. Kishore
(74) *Attorney, Agent, or Firm*—Thelen Reid & Priest LLP; Lee M. Pederson

(57) **ABSTRACT**

A lipid composition forms liposomes spontaneously upon mixing with an aqueous solution. The lipid composition includes diacylglycerol-PEG compounds. Such lipid compositions are useful for forming liposomes, which in turn are useful for a variety of purposes, including the delivery of therapeutic agents.

5 Claims, 5 Drawing Sheets



PEG-12 Glyceryl Dioleate