



US009510884B2

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

(10) **Patent No.:** **US 9,510,884 B2**
(45) **Date of Patent:** **Dec. 6, 2016**

(54) **BIODEGRADABLE IMPLANT AND FABRICATION METHOD THEREOF**

(71) Applicant: **OLYMPUS CORPORATION**, Tokyo (JP)

(72) Inventors: **Masato Tamai**, Hachioji (JP);
Takamitsu Sakamoto, Hachioji (JP)

(73) Assignee: **OLYMPUS CORPORATION**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 624 days.

(21) Appl. No.: **13/943,947**

(22) Filed: **Jul. 17, 2013**

(65) **Prior Publication Data**

US 2013/0304134 A1 Nov. 14, 2013

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2012/051202, filed on Jan. 20, 2012.

(30) **Foreign Application Priority Data**

Jan. 24, 2011 (JP) 2011-012359
Jan. 11, 2012 (JP) 2012-003547

(51) **Int. Cl.**

A61L 27/00 (2006.01)

A61B 17/86 (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **A61B 17/866** (2013.01); **A61L 27/047** (2013.01); **A61L 27/306** (2013.01); **A61L 27/58** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC A61F 2210/0004; A61F 2210/0009; A61L 27/047

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,888,841 B2* 11/2014 Pandelidis A61L 27/047 623/1.15

9,333,099 B2* 5/2016 Pacetti A61F 2/82

(Continued)

FOREIGN PATENT DOCUMENTS

CN 101484599 A 7/2009
EP 1 997 522 A1 12/2008

(Continued)

OTHER PUBLICATIONS

Gray-Munro, J.E. et al., "Influence of surface of modification on the in vitro corrosion rate of magnesium alloy AZ31", Journal of Biomedical Materials Research (2009), vol. 91, No. 1, pp. 221-230.

(Continued)

Primary Examiner — David Bates

(74) *Attorney, Agent, or Firm* — Scully, Scott, Murphy & Presser, P.C.

(57) **ABSTRACT**

The present invention can suitably be used even in a site where hydrogen gas is metabolized slowly, such as the osseous tissue. Provided is a biodegradable implant including a biodegradable magnesium member formed of a magnesium alloy and coating layers that coat the biodegradable magnesium member, thereby reducing the degradation rate thereof in a living organism, wherein a depression to be infiltrated by an osteoblast is formed in a surface of the biodegradable magnesium member.

18 Claims, 12 Drawing Sheets

