US009486558B2

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

(10) **Patent No.: US 9,486,558 B2**
(45) **Date of Patent: Nov. 8, 2016**

(54) **POROUS MATRIX**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1586 days.

(21) Appl. No.: **12/117,683**

(22) Filed: **May 8, 2008**

(65) **Prior Publication Data**

US 2008/0241248 A1 Oct. 2, 2008

Related U.S. Application Data

(62) Division of application No. 10/550,151, filed as application No. PCT/GB2004/001419 on Mar. 29, 2004.

(30) **Foreign Application Priority Data**

Mar. 27, 2003 (GB) 0307011.7

(51) **Int. Cl.**

A61F 2/00	(2006.01)
A61K 9/00	(2006.01)
A61L 27/56	(2006.01)
A61L 27/54	(2006.01)

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

CPC ***A61L 27/56*** (2013.01); ***A61L 27/54*** (2013.01); *A61L 2300/254* (2013.01); *A61L 2300/406* (2013.01); *A61L 2300/414* (2013.01); *A61L 2300/43* (2013.01)

(58) **Field of Classification Search**

USPC 424/423, 484, 486, 488, 93.7; 435/325, 435/366, 404

IPC A61L 27/56,31/16, 27/36, 27/54, 27/00, A61L 2300/254, 2300/406, 2300/414, 2300/43; A61N 1/3605, 1/362; A61F 2/00; A61K 9/00, A61K 35/12; C12N 5/06, 5/08

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,938,763	A	7/1990	Dunn et al.	
4,997,443	A	3/1991	Walthall et al.	
5,077,049	A	12/1991	Dunn et al.	
5,278,201	A	1/1994	Dunn et al.	
5,278,202	A	1/1994	Dunn et al.	
5,324,519	A	6/1994	Dunn et al.	
5,340,849	A	8/1994	Dunn et al.	
5,344,701	A	9/1994	Gagnon et al.	
5,368,859	A	11/1994	Dunn et al.	
5,487,897	A	1/1996	Polson et al.	
5,502,092	A	3/1996	Suszko et al.	
5,599,552	A	2/1997	Dunn et al.	
5,612,052	A *	3/1997	Shalaby	424/426
5,632,727	A	5/1997	Tipton et al.	
5,650,176	A	7/1997	Lee et al.	
5,660,849	A	8/1997	Polson et al.	
5,667,778	A	9/1997	Atala	
5,676,976	A	10/1997	Lee et al.	
5,677,284	A	10/1997	Li	
5,683,461	A	11/1997	Lee et al.	
5,702,716	A	12/1997	Tipton et al.	
5,709,854	A	1/1998	Griffith-Cima et al.	
5,725,491	A	3/1998	Tipton et al.	
5,733,950	A	3/1998	Dunn et al.	
5,739,176	A	4/1998	Dunn et al.	
5,866,155	A *	2/1999	Laurencin et al.	424/425
5,976,526	A	11/1999	Atala	
6,027,742	A	2/2000	Lee et al.	
6,060,053	A	5/2000	Atala	
6,071,530	A	6/2000	Polson et al.	
6,117,456	A	9/2000	Lee et al.	
6,129,761	A	10/2000	Hubbell	
6,132,463	A	10/2000	Lee et al.	
6,139,578	A	10/2000	Lee et al.	
6,143,293	A	11/2000	Weiss et al.	
6,214,368	B1	4/2001	Lee et al.	
6,224,893	B1	5/2001	Langer et al.	
6,277,151	B1	8/2001	Lee et al.	
6,287,341	B1	9/2001	Lee et al.	
6,290,729	B1 *	9/2001	Slepian et al.	623/23.72

(Continued)

FOREIGN PATENT DOCUMENTS

CN	1339289	3/2002
DE	69626979T T2	5/1996

(Continued)

OTHER PUBLICATIONS

Sawhney et al .1993 Bioerodible Hydrogels Based on Photopolymerized Poly(ethylene glycol)-co-poly(a-hydroxy acid) Diacrylate Macromers.Macromolecules, vol. 26, 581-587.*

1993. Bioerodible Hydrogels Based on Photopolymerized Poly(ethylene glycol)-co-poly(a-hydroxy acid) Diacrylate Macromers.Macromolecules, vol. 26, 581-587.*

Yasuhiko Tabata,Manabu Miyao, Masaya Yamamoto and Yoshito Ikada, Vascularization ina porous sponge by sustained release of basic fibroblast growth factor, Institute for Frontier Medical Sciences, Kyoto University, Kyoto, Japan, J. Biomater. Sci. Polymer Edn. vol. 10, No. 9, pp. 957-965, 1999.

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(57) **ABSTRACT**

A porous matrix suitable for use as a tissue scaffold is described. The matrix may be shaped before insertion into or at the target tissue site, or injected via a minimally invasive method. The matrix may be pre-seeded with cells of the target tissue or may be used to support growth of the local endogenous tissue. The matrix may contain growth factors or other pharmacologically acceptable moieties such as antibiotics.

10 Claims, 3 Drawing Sheets