

Title (en)

FIBRE MESHES WITH CONTROLLED PORE SIZES

Title (de)

FASERNETZE MIT KONTROLLIERTEN PORENGRÖSSEN

Title (fr)

MAILLES DE FIBRES À TAILLES DE PORES CONTRÔLÉES

Publication

**EP 3483321 A1 20190515 (EN)**

Application

**EP 17201061 A 20171110**

Priority

EP 17201061 A 20171110

Abstract (en)

A method for controlling stable pore size, pore shape, overall porosity, mat thickness or mat volume of a random fibre network, comprising a stack of layers of randomly distributed fibres in form of a non-woven mat, with average fibre thickness (d), with a variety of fibre segments between cross-links along the fibres with average fibre segment length (ls) between cross-links, at which different fibres are fixed, should be simplified and made more cost-efficient. This is reached by providing a fibre network, wherein the aspect ratio between fibre segment length (ls) and the fibre diameter (d) is greater than or equal to 5, clamping of the fibre network at at least one margin of the fibre network and application of a tension in at least one direction (x, y) of the fibre network from at least one side, reaching a stretch-expansion of the fibre network due to the inclination of some fibres towards the direction which is perpendicular to the axis of loading, by buckling of fibre segments in the out-of-plane direction, leaving network integrity and fibres undamaged.

IPC 8 full level

**D04H 1/4291** (2012.01); **D04H 1/4334** (2012.01); **D04H 1/435** (2012.01); **D04H 1/4358** (2012.01); **D04H 1/728** (2012.01)

CPC (source: EP)

**D04H 1/4291** (2013.01); **D04H 1/4334** (2013.01); **D04H 1/435** (2013.01); **D04H 1/4358** (2013.01); **D04H 1/728** (2013.01)

Citation (applicant)

- WO 2014205306 A1 20141224 - UNIV SYRACUSE [US]
- WO 2014205306 A1 20141224 - UNIV SYRACUSE [US]
- WO 2011153304 A1 20111208 - COOK MEDICAL TECHNOLOGIES LLC [US], et al
- US 2015257763 A1 20150917 - BLUM KEVIN [US], et al
- US 2004153117 A1 20040805 - CLUBB THOMAS L [US], et al
- US 2004153118 A1 20040805 - CLUBB THOMAS L [US], et al
- US 2004153119 A1 20040805 - KUSLEIKA RICHARD S [US], et al
- EP 2575637 A1 20130410 - COOK MEDICAL TECHNOLOGIES LLC [US]
- US 2015257763 A1 20150917 - BLUM KEVIN [US], et al
- FANG, J. ET AL.: "Applications of electrospun nanofibers", CHINESE SCIENCE BULLETIN, vol. 53, no. 15, 2008, pages 2265 - 2286
- JOSHI, V.S. ET AL.: "Macroporosity enhances vascularization of electrospun scaffolds", JOURNAL OF SURGICAL RESEARCH, vol. 183, no. 1, 2013, pages 18 - 26
- VAQUETTE, C.; J.J. COOPER-WHITE: "Increasing electrospun scaffold pore size with tailored collectors for improved cell penetration", ACTA BIOMATERIALIA, vol. 7, no. 6, 2011, pages 2544 - 2557, XP028199373, DOI: doi:10.1016/j.actbio.2011.02.036
- ZHU ET AL.: "Electrospun fibrous mats with high porosity as potential scaffolds for skin tissue engineering", BIOMACROMOLECULES, vol. 9, no. 7, 2008, pages 1795 - 1801, XP055066926, DOI: doi:10.1021/bm800476u
- BLAKENEY ET AL.: "Cell infiltration and growth in a low density, uncompressed three-dimensional electrospun nanofibrous scaffold", BIOMATERIALS, vol. 32, no. 6, 2011, pages 1583 - 1590, XP027568276
- BOWLIN, G.: "Enhanced porosity without compromising structural integrity: the nemesis of electrospun scaffolding", JOURNAL OF TISSUE SCIENCE & ENGINEERING, vol. 2, 2011, pages 103e, XP055112070, DOI: doi:10.4172/2157-7552.1000103e
- TZEZANA, R.; E. ZUSSMAN; S. LEVENBERG: "A Layered Ultra-Porous Scaffold for Tissue Engineering, Created via a Hydrospinning Method", TISSUE ENGINEERING PART C-METHODS, vol. 14, no. 4, 2008, pages 281 - 288
- COBURN, J. ET AL.: "Biomimetics of the extracellular matrix: an integrated three-dimensional fiber-hydrogel composite for cartilage tissue engineering", SMART STRUCTURES AND SYSTEMS, vol. 7, no. 3, 2011, pages 213 - 222, XP055172968, DOI: doi:10.12989/ss.2011.7.3.213
- LEE, J.B. ET AL.: "Highly porous electrospun nanofibers enhanced by ultrasonication for improved cellular infiltration", TISSUE ENG PART A, vol. 17, no. 21-22, 2011, pages 2695 - 702
- SHIM, I.K. ET AL.: "Novel three-dimensional scaffolds of poly((L)-lactic acid) microfibers using electrospinning and mechanical expansion: fabrication and bone regeneration", JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART B-APPLIED BIOMATERIALS, vol. 95b, no. 1, 2010, pages 150 - 160
- SIMONET, M. ET AL.: "Ultraporous 3D polymer meshes by low-temperature electrospinning: Use of ice crystals as a removable void template", POLYMER ENGINEERING AND SCIENCE, vol. 47, no. 12, 2007, pages 2020 - 2026
- KI, C.S. ET AL.: "Development of 3-D nanofibrous fibroin scaffold with high porosity by electrospinning: implications for bone regeneration", BIOTECHNOLOGY LETTERS, vol. 30, no. 3, 2008, pages 405 - 410, XP019570029
- KERR-PHILLIPS, T.E. ET AL.: "Electrospun rubber fibre mats with electrochemically controllable pore sizes", JOURNAL OF MATERIALS CHEMISTRY B, vol. 3, no. 20, 2015, pages 4249 - 4258

Citation (search report)

- [X1] CN 107268185 A 20171020 - UNIV NATIONAL DONG HWA
- [X1] CN 107217390 A 20170929 - UNIV NATIONAL DONG HWA
- [X1] GB 2514074 A 20141119 - UNIV MALTA [MT]
- [X1] US 2014114266 A1 20140424 - ARCAND BENJAMIN Y [US]
- [X1] AU 2015201164 B2 20160630 - AMS RES CORP [US]
- [X1] US 2005142331 A1 20050630 - ANDERSON RALPH L [US], et al
- [X1] US 2015073324 A1 20150312 - LIEBE TINA [DE], et al

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

**EP 3483321 A1 20190515**; EP 3707301 A1 20200916; WO 2019092166 A1 20190516

DOCDB simple family (application)

**EP 17201061 A 20171110**; EP 18800155 A 20181109; EP 2018080724 W 20181109