



(11) **EP 3 990 620 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

- (45) Date of publication and mention of the grant of the patent: **13.12.2023 Bulletin 2023/50**
- (21) Application number: **20743589.2**
- (22) Date of filing: **29.06.2020**
- (51) International Patent Classification (IPC):  
**C12N 5/00** (2006.01) **C12N 5/079** (2010.01)  
**C12Q 1/02** (2006.01)
- (52) Cooperative Patent Classification (CPC):  
**C12N 5/0622; C12N 5/0619; C12N 5/0697;**  
C12N 2502/081; C12N 2502/086; C12N 2502/28;  
C12N 2503/00; C12N 2533/50
- (86) International application number:  
**PCT/EP2020/068264**
- (87) International publication number:  
**WO 2020/260697 (30.12.2020 Gazette 2020/53)**

(54) **IN VITRO CELL CULTURE SYSTEM UNDER AEROBIC CONDITIONS SUITABLE FOR PHYSIOLOGICAL, PATHOLOGICAL, PHARMACOLOGICAL AND TOXICOLOGICAL INVESTIGATIONS**

IN-VITRO-ZELLKULTURSYSTEM UNTER AEROBEN BEDINGUNGEN FÜR PHYSIOLOGISCHE, PATHOLOGISCHE, PHARMAKOLOGISCHE UND TOXIKOLOGISCHE UNTERSUCHUNGEN

SYSTÈME DE CULTURE CELLULAIRE IN VITRO DANS DES CONDITIONS AÉROBIES APPROPRIÉES POUR DES RECHERCHES PHYSIOLOGIQUES, PATHOLOGIQUES, PHARMACOLOGIQUES ET TOXICOLOGIQUES

- (84) Designated Contracting States:  
**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**
- (30) Priority: **28.06.2019 IT 201900010428**
- (43) Date of publication of application:  
**04.05.2022 Bulletin 2022/18**
- (73) Proprietor: **Armato, Ubaldo**  
**37059 Zevio (IT)**
- (72) Inventors:  
• **ARMATO, Ubaldo**  
**37059 Zevio (IT)**  
• **DAL PRÀ, Iliaria Pierpaola**  
**37059 Zevio (VR) (IT)**  
• **CHIARINI, Anna Maria**  
**25018 Montichiari (BS) (IT)**
- (74) Representative: **Calogero, Ida et al**  
**BIRD & BIRD SOCIETA TRA AVVOCATI S.R.L.**  
**Via Porlezza, 12**  
**20123 Milano (IT)**
- (56) References cited:  
• **WENDT H ET AL: "Artificial Skin - Culturing of Different Skin Cell Lines for Generating an Artificial Skin Substitute on Cross-Weaved Spider Silk Fibres", PLOS ONE, vol. 6, no. 7, E21833, 26 July 2011 (2011-07-26), XP055299717, DOI: 10.1371/journal.pone.0021833**  
• **LIU J ET AL: "Silk Fibroin as a Biomaterial Substrate for Corneal Epithelial Cell Sheet Generation", INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE, vol. 53, no. 7, 25 June 2012 (2012-06-25), pages 4130-4138, XP055675388, ISSN: 1552-5783, DOI: 10.1167/iovs.12-9876**  
• **WANG S ET AL: "In vitro 3D corneal tissue model with epithelium, stroma, and innervation", BIOMATERIALS, vol. 112, 4 October 2016 (2016-10-04), pages 1-9, XP029812696, ISSN: 0142-9612, DOI: 10.1016/J.BIOMATERIALS.2016.09.030**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

**EP 3 990 620 B1**

- **GOSSELIN E A ET AL: "Multi-layered silk film coculture system for human corneal epithelial and stromal stem cells", JOURNAL OF TISSUE ENGINEERING AND REGENERATIVE MEDICINE, vol. 12, no. 1, January 2018 (2018-01), pages 285-295, XP055675394, ISSN: 1932-6254, DOI: 10.1002/term.2499**
- **GUPTA A K ETAL: "Scaffolding kidney organoids on silk", JOURNAL OF TISSUE ENGINEERING AND REGENERATIVE MEDICINE, vol. 13, no. 5, 20 May 2019 (2019-05-20), pages 812-822, XP055675397, ISSN: 1932-6254, DOI: 10.1002/term.2830**

Remarks:

The complete document including Reference Table(s) and the Sequence Listing(s) can be downloaded from the EPO website