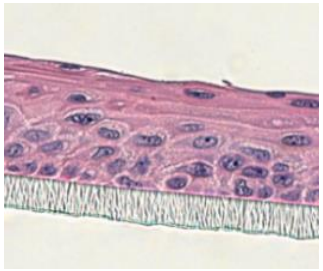
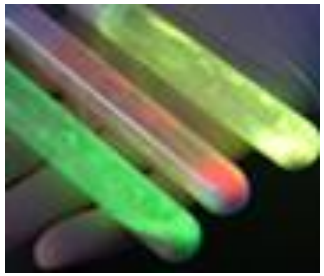
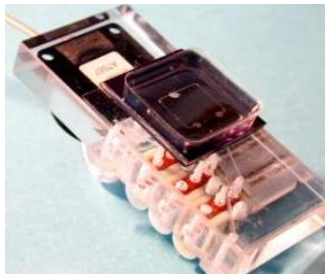
BIOLOGY MEETS BIOMATERIALS – AKTUELLE TRENDS IM TISSUE ENGINEERING

Expertenpanel „Biomaterialien“

Dr. Angela Rossi


Prof. Dr. Heike Walles
Department Tissue Engineering and Regenerative Medicine (TERM), **University Hospital Würzburg** and
Translational Center Würzburg „Regenerative therapies“ **Würzburg branch of the Fraunhofer IGB**

Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

The Translational Center

- The Department Tissue Engineering and Regenerative Medicine (TERM) from the University Hospital Wuerzburg (founded 2009)
- and the Translational Center "Regenerative Therapies for Oncology and Musculoskeletal Diseases", Wuerzburg branch (founded 2014) of Fraunhofer IGB
- build the Translational Center for Regenerative Medicine (TC:RM)

TERM Department Tissue Engineering & Regenerative Medicine + Fraunhofer IGB = TC:RM Translational Center for Regenerative Medicine

Julius-Maximilians-Universität Würzburg · UK · TERM Department Tissue Engineering & Regenerative Medicine · Fraunhofer IGB

The Translational Center

The Translational Center

A joint research center by Fraunhofer & University Hospital Würzburg

Bioreactors

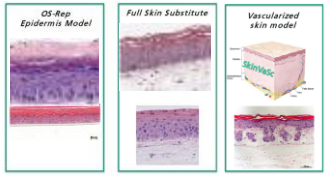
Advanced culture conditions

Bioreactor for vascularized skin

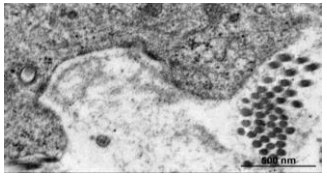
Establishment of protocols for substance testing via a dual-arm robot

Tissue Models

Alternative to animal testing



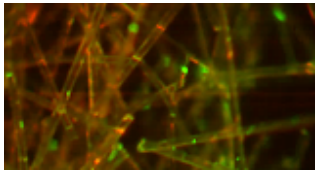
BioVaSc® based tissue models of increasing complexity



Disease models – *in vitro* model for *B. pertussis* infection

Theranostics

New particle-based diagnosis and therapies



Dye labeled macrophage colonization on wound dressing

Luminescent inorganic nanoparticle powder

Implants

Safety testing for regenerative medicine

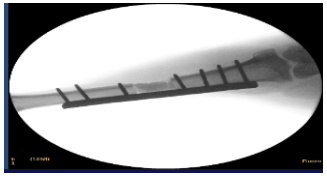
Implantation of the first vascularized trachea patch

Preclinical studies of vascularized bone implants (critical size)

Regulatory Affairs

Implementation of accredited tests

Preclinical and clinical studies of medical products



Modification of implant materials and surfaces

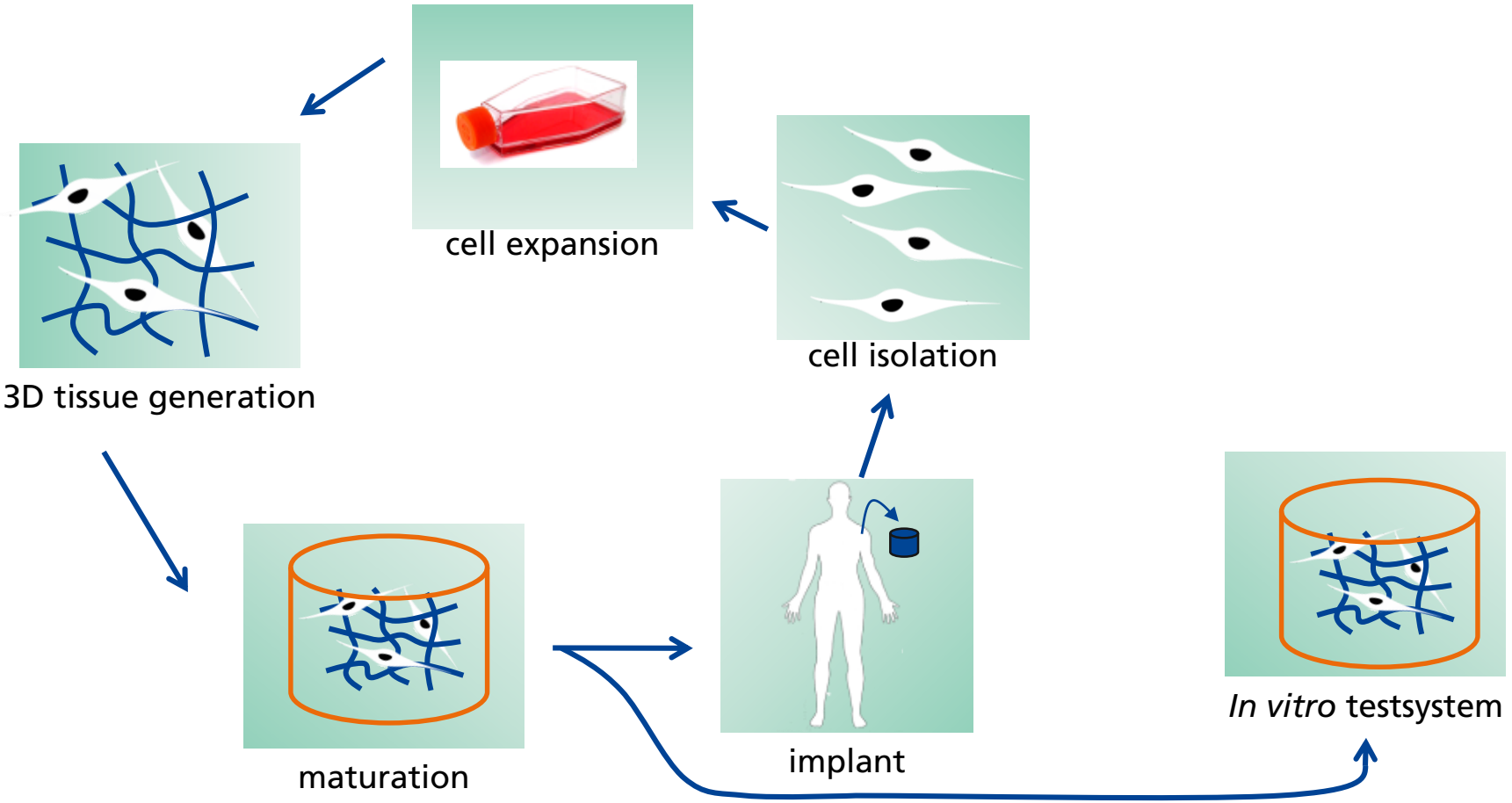
Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

UK

TERM
Department Tissue Engineering & Regenerative Medicine

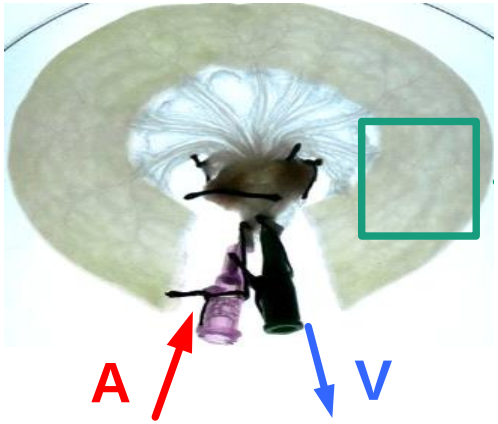
Fraunhofer
IGB

Concept of Tissue Engineering

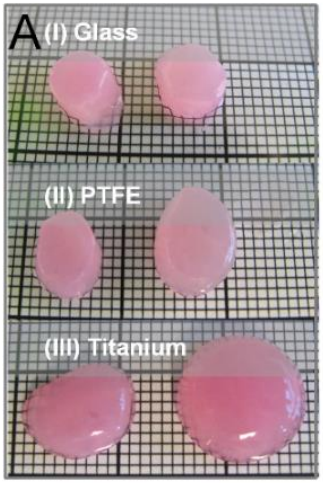


Biology meets biomaterials

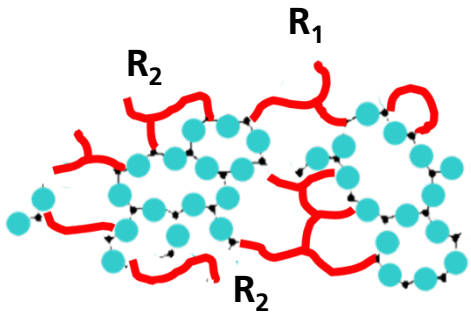
Decellularised matrices



Testsystem-foreign body reactions



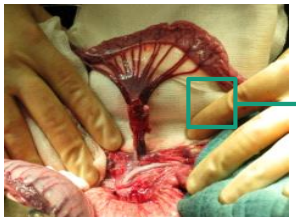
Hybridpolymers



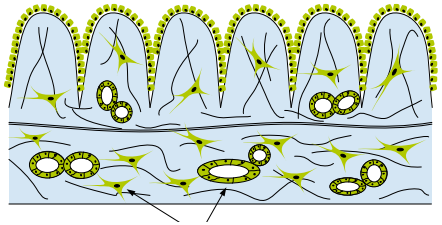
Hybridmaterials on ORMOCER®-basis

Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

Decellularised matrix
Technology platform BioVaSc-TERM®



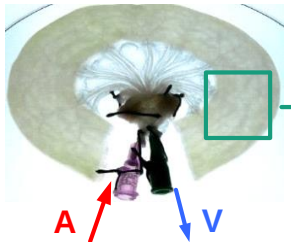
Porcine intestine



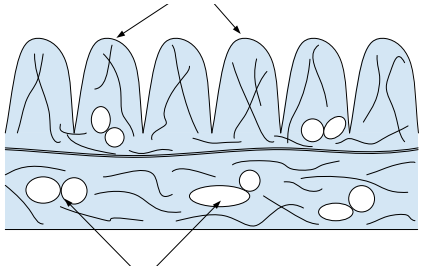
Porcine cells

Decellularization

Collagen structure



Biological Vascularized Scaffold (BioVaSc®)



Vascular structures

- Acellular part of a porcine jejunum
- Collagen I/III
- Intact blood vessel system

Mertsching H, Schanz J, Steger V, Schandar M, Schenk M, Hansmann J, Dally I, Friedel G, Walles T. Generation and transplantation of an autologous vascularized bioartificial human tissue. Transplantation. 2009 Jul 27;88(2):203-10.

Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

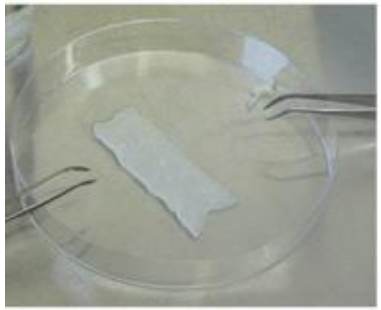
UK

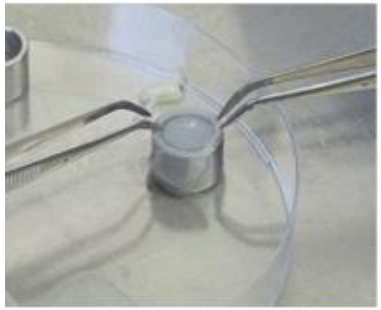
TERM
Department Tissue Engineering & Regenerative Medicine

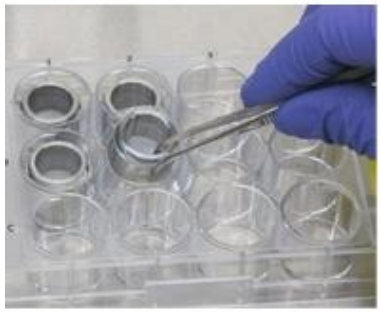
Fraunhofer
IGB

Static and dynamic culture of BioVaSc®

Static culture

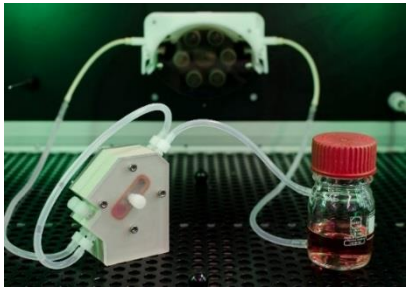






BioVaSc®

Dynamic culture



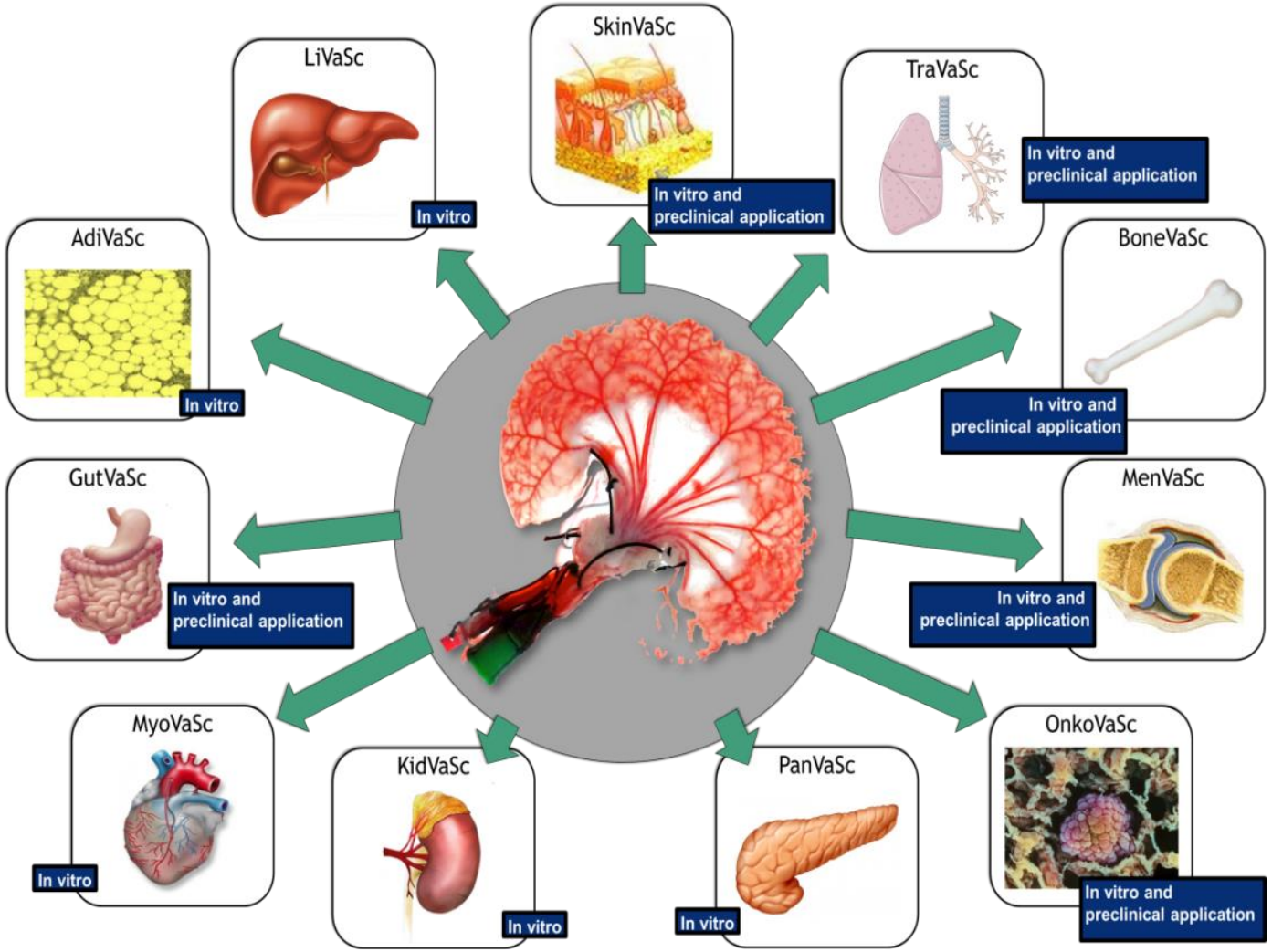
Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

UK

TERM
Department Tissue Engineering & Regenerative Medicine

Fraunhofer
IGB

BioVaSc-TERM® – Platform Technology



Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

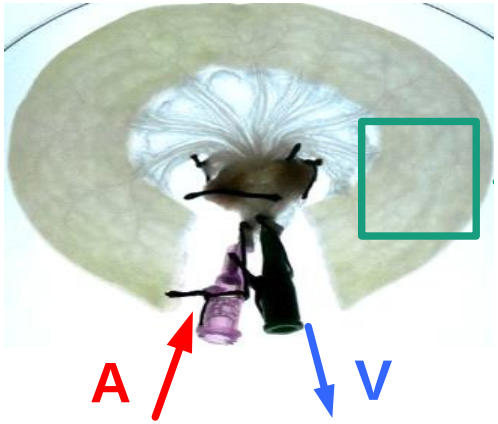
UK

TERM
Department Tissue Engineering & Regenerative Medicine

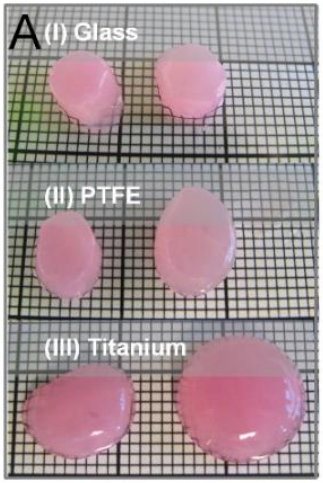
Fraunhofer
IGB

Biology meets biomaterials

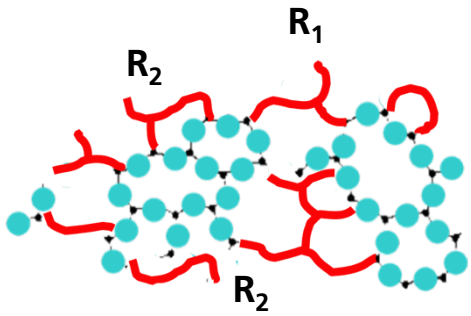
Decellularised matrices



Testsystem-foreign body reactions



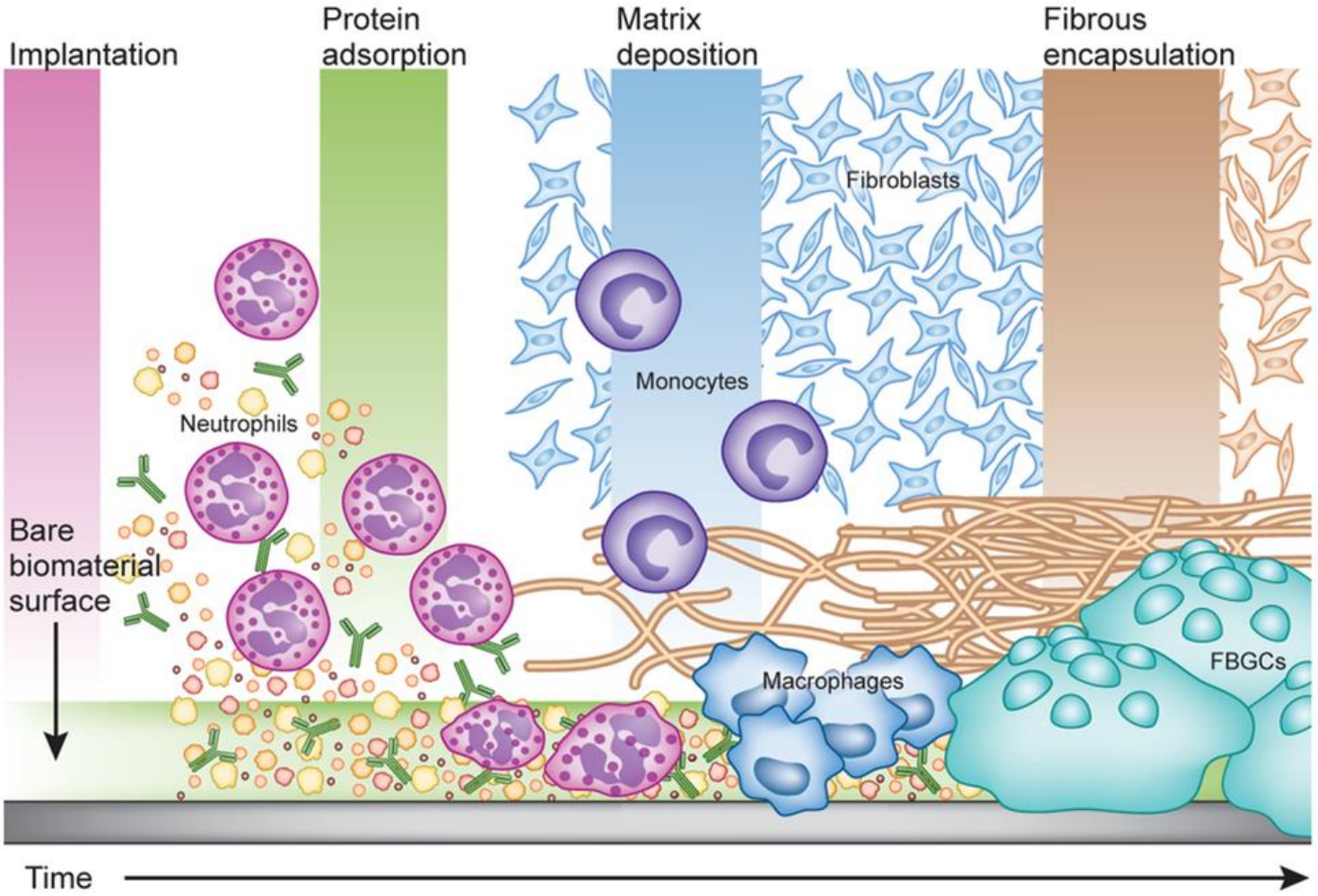
Hybridpolymers



Hybridmaterials on ORMOCER®-basis

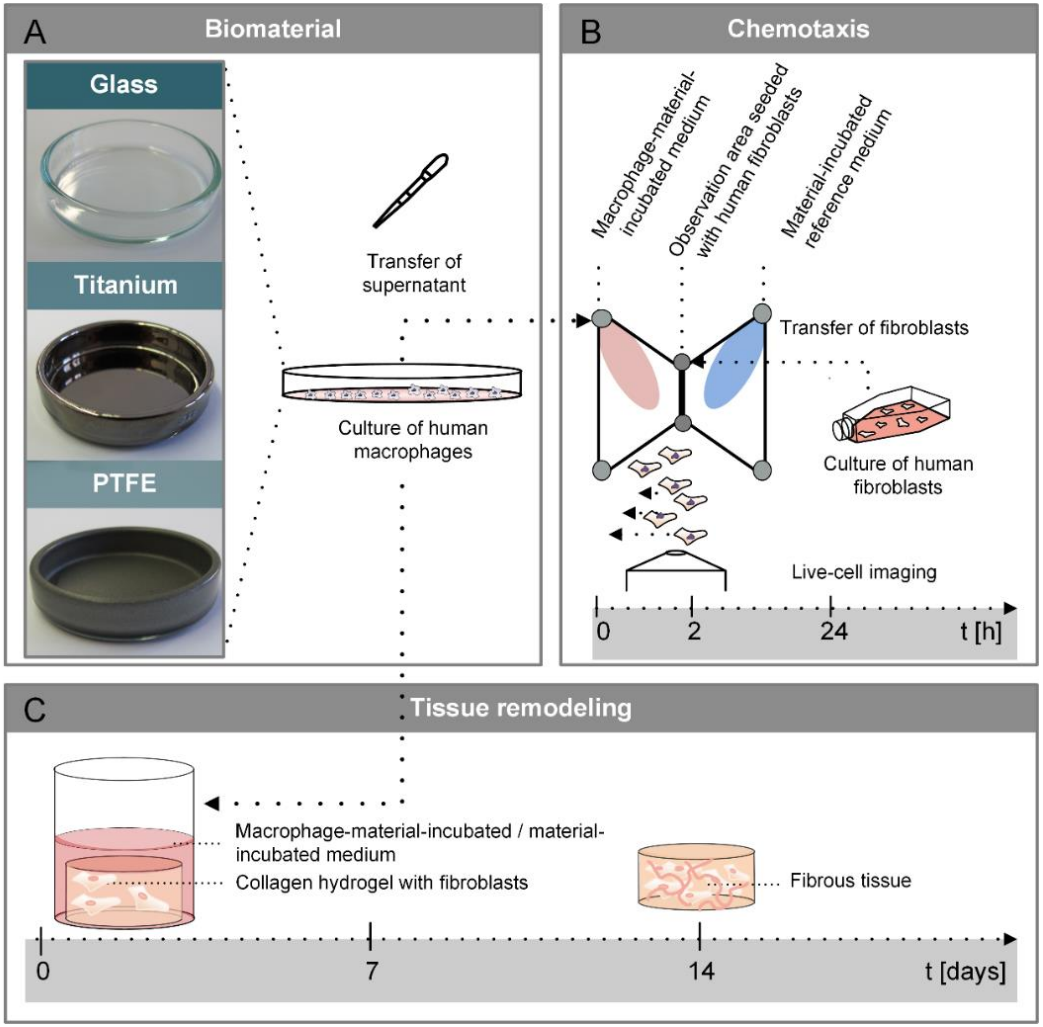
Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

Foreign body reaction



Grainger, D. W. All charged up about implanted biomaterials. Nature biotechnology, June, 2013.

Testsystem-foreign body reaction



Jannasch, M., Gätzner, S., Weigel, T., Walles, H., Schmitz, T., Hansmann, J.; In vitro chemotaxis and tissue remodeling assays quantitatively characterize foreign body reaction; ALTEX, October 11, 2016.

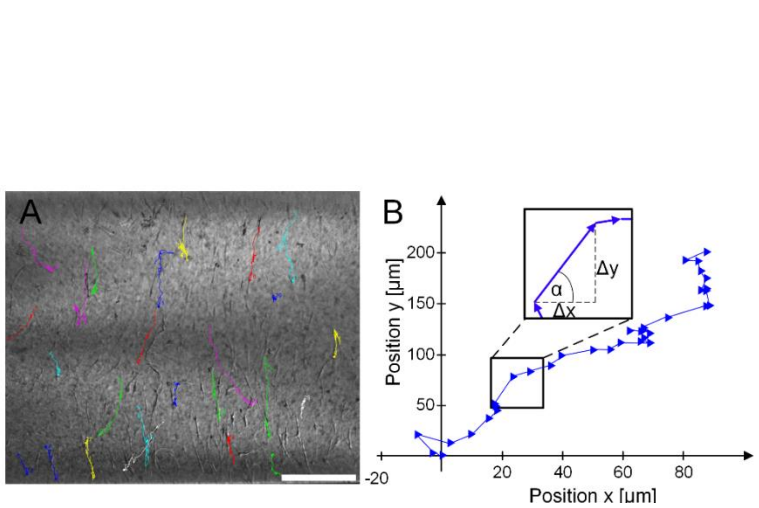
Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

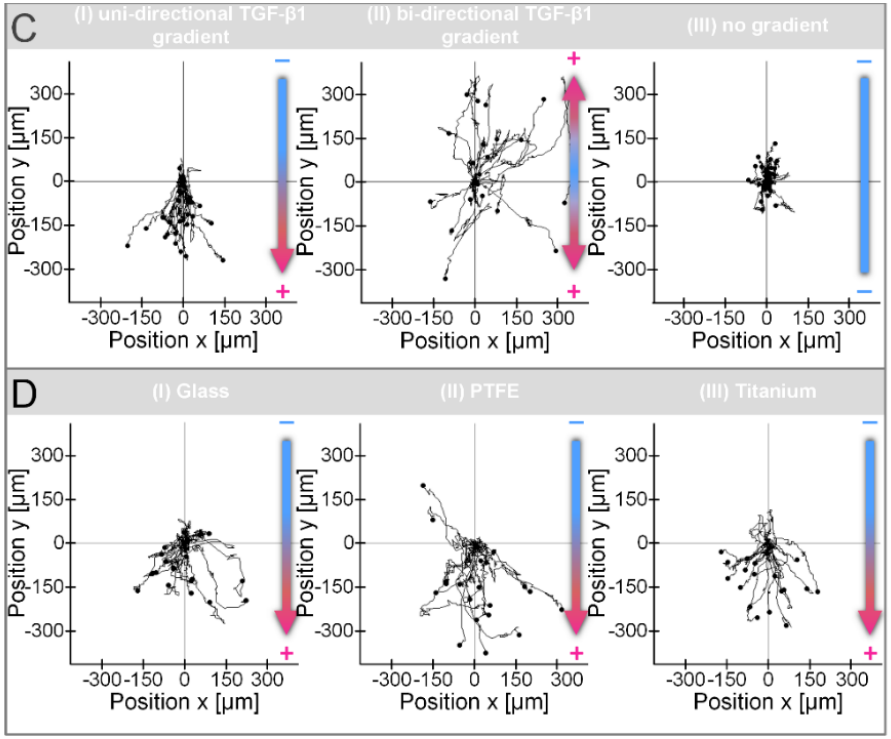
UK

TERM
Department Tissue Engineering & Regenerative Medicine

Fraunhofer
IGB

Testsystem-foreign body reaction





Jannasch, M., Gätzner, S., Weigel, T., Walles, H., Schmitz, T., Hansmann, J.; In vitro chemotaxis and tissue remodeling assays quantitatively characterize foreign body reaction; ALTEX, October 11, 2016.

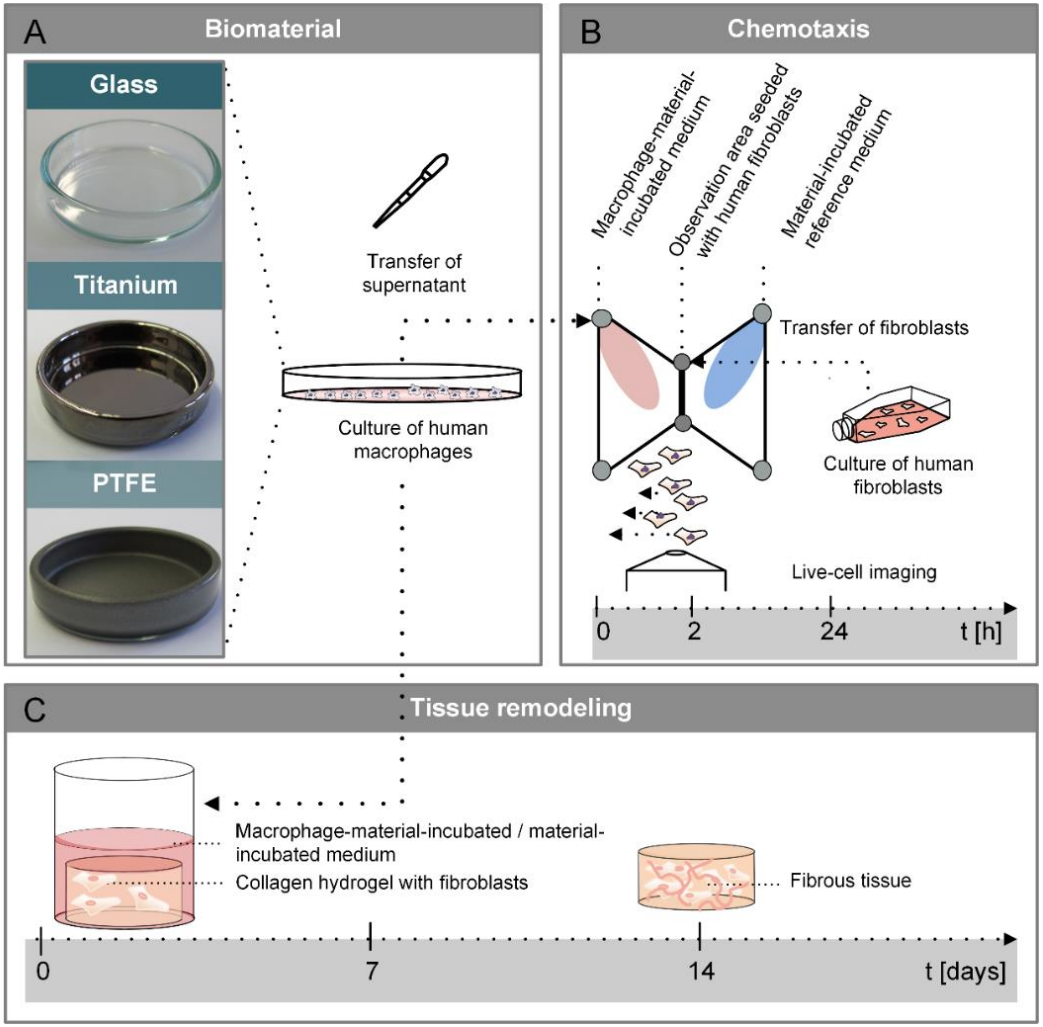
Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

UK

TERM
Department Tissue Engineering & Regenerative Medicine

Fraunhofer
IGB

Testsystem-foreign body reaction



Jannasch, M., Gätzner, S., Weigel, T., Walles, H., Schmitz, T., Hansmann, J.; In vitro chemotaxis and tissue remodeling assays quantitatively characterize foreign body reaction; ALTEX, October 11, 2016.

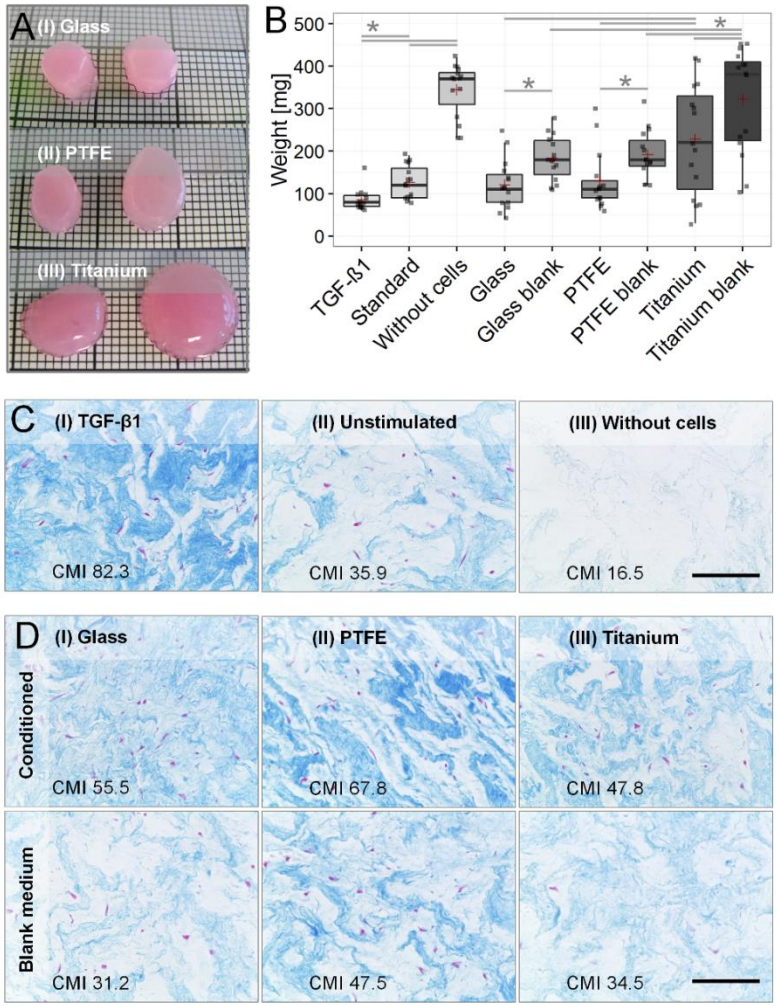
Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

UK

TERM
Department Tissue Engineering & Regenerative Medicine

Fraunhofer
IGB

Testsystem-foreign body reaction



Jannasch, M., Gätzner, S., Weigel, T., Walles, H., Schmitz, T., Hansmann, J.; In vitro chemotaxis and tissue remodeling assays quantitatively characterize foreign body reaction; ALTEX, October 11, 2016.

Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

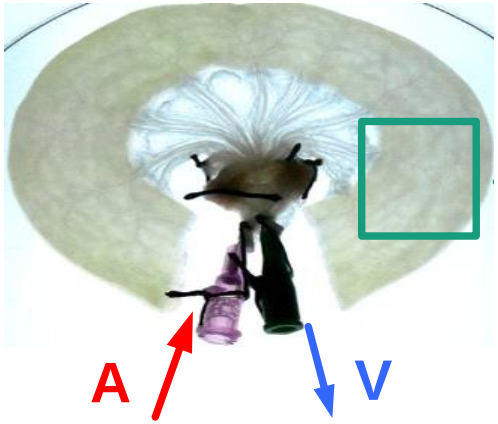
UK

TERM
Department Tissue Engineering & Regenerative Medicine

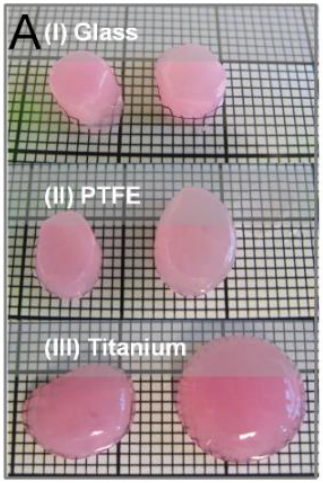
Fraunhofer
IGB

Biology meets biomaterials

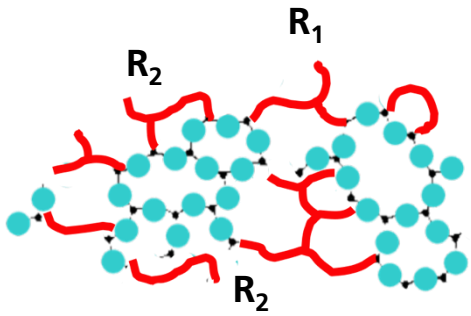
Decellularised matrices



Testsystem-foreign body reactions



Hybridpolymers



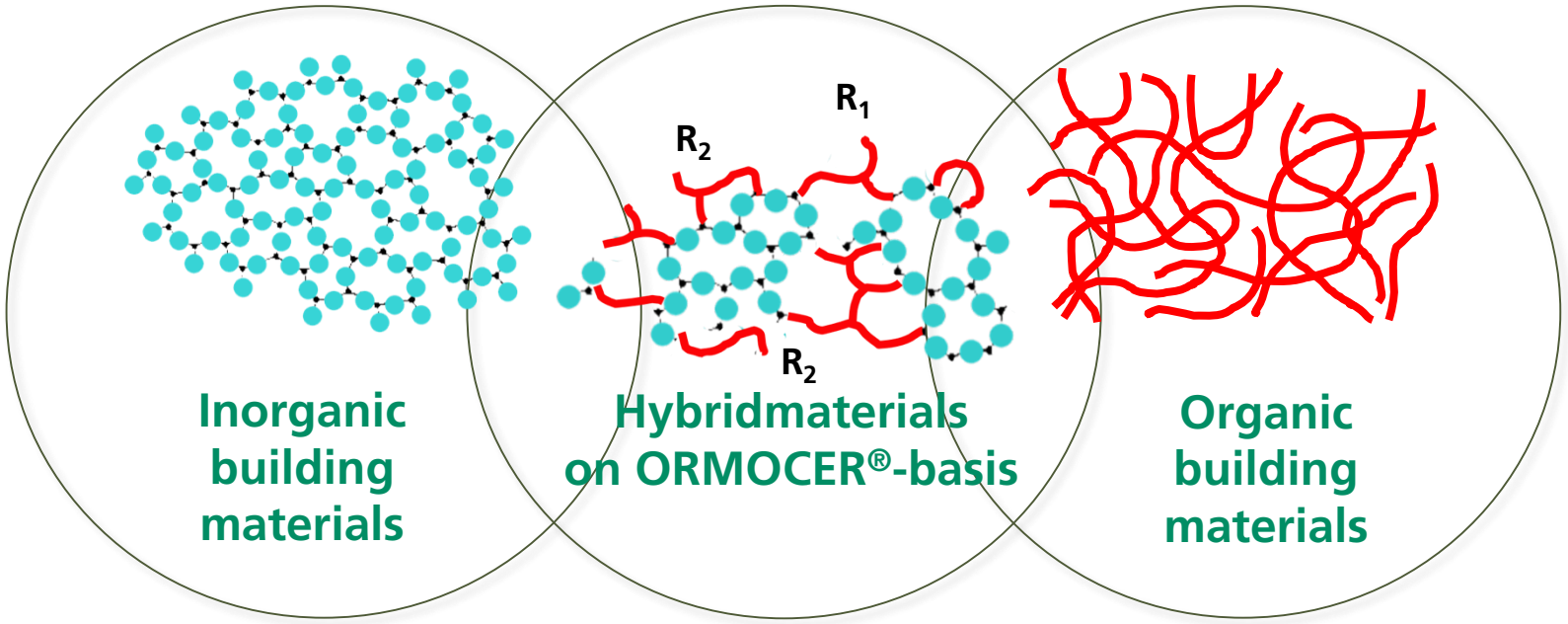
Hybridmaterials on ORMOCER®-basis

Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

ORMOCER®

ORMOCER® chemistry (hybridpolymers)

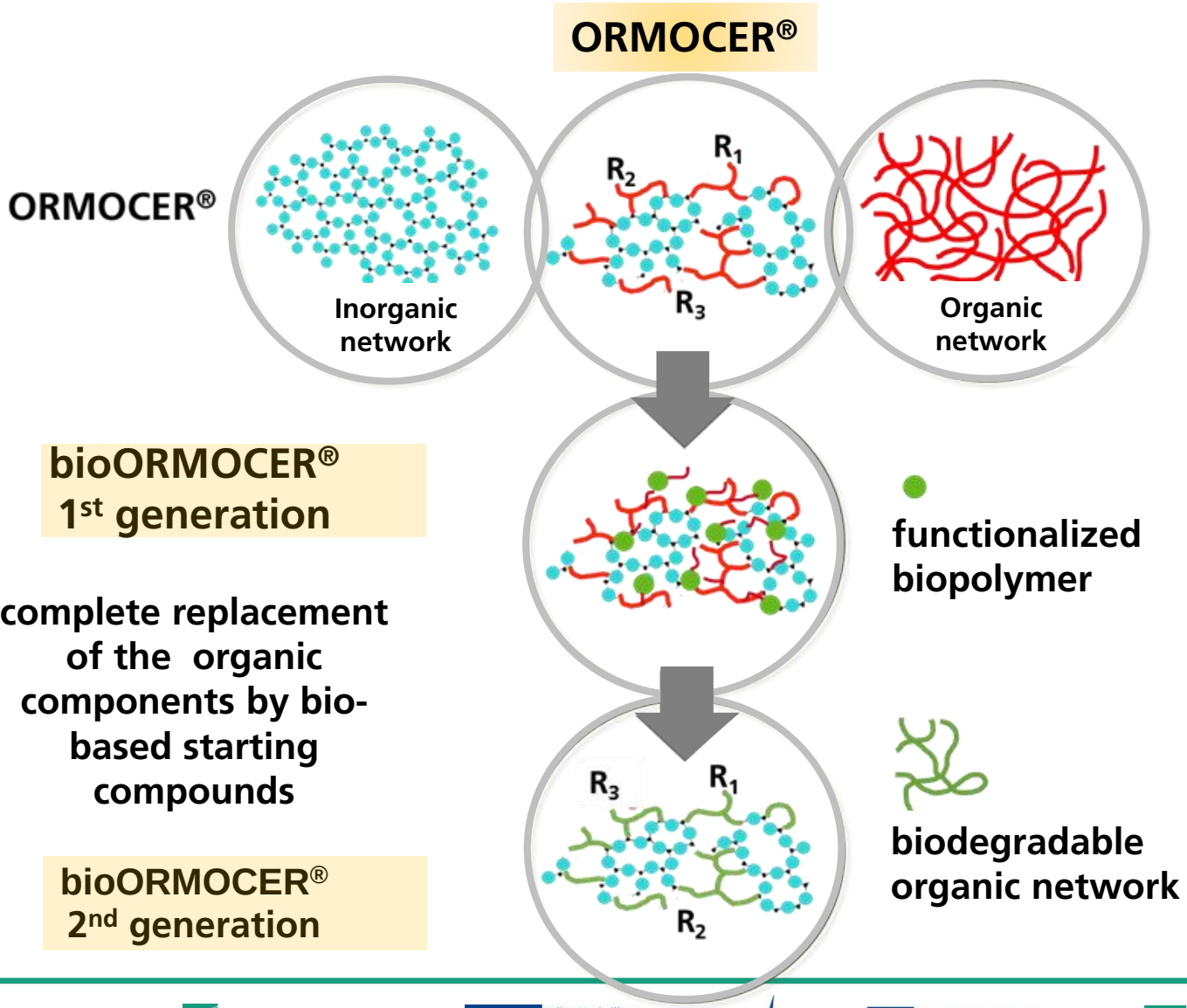
Creative use of variable material properties to generate new functions



ORMOCER®e, im Fraunhofer ISC entwickelt, Marke der Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., München

Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

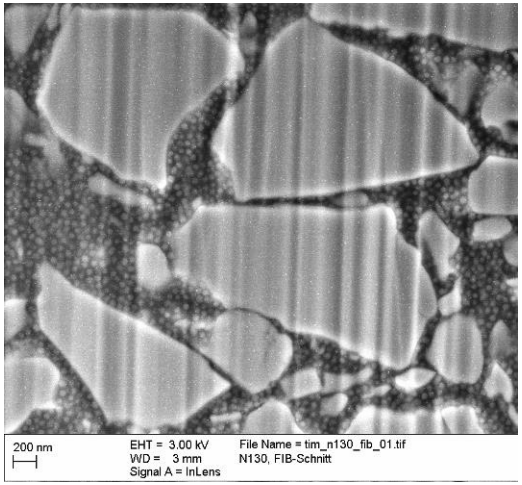
ORMOCER® and bioORMOCER®



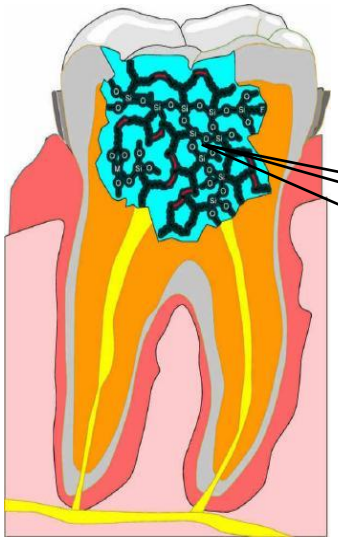
Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

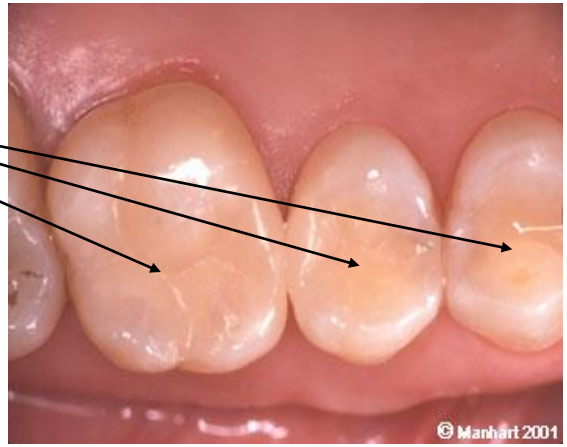
Nano-hybrid composite for dental medicine

- practically invisible - enamel like
- permanent
- well processable
- biocompatible - for patients and medical staff
- no shrinking of the filling during hardening



SEM-picture of a ORMOCER®-based nanocomposite

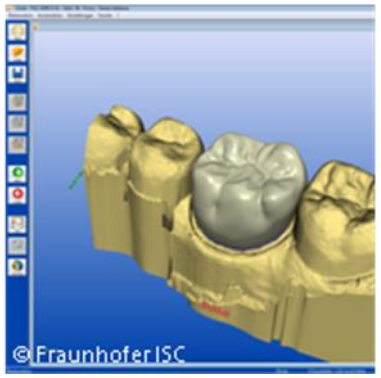




Fraunhofer ISC | Julius-Maximilians-Universität Würzburg | UK | TERM Department Tissue Engineering & Regenerative Medicine | Fraunhofer IGB

ORMOCER® - based chairside crowns

dental cast

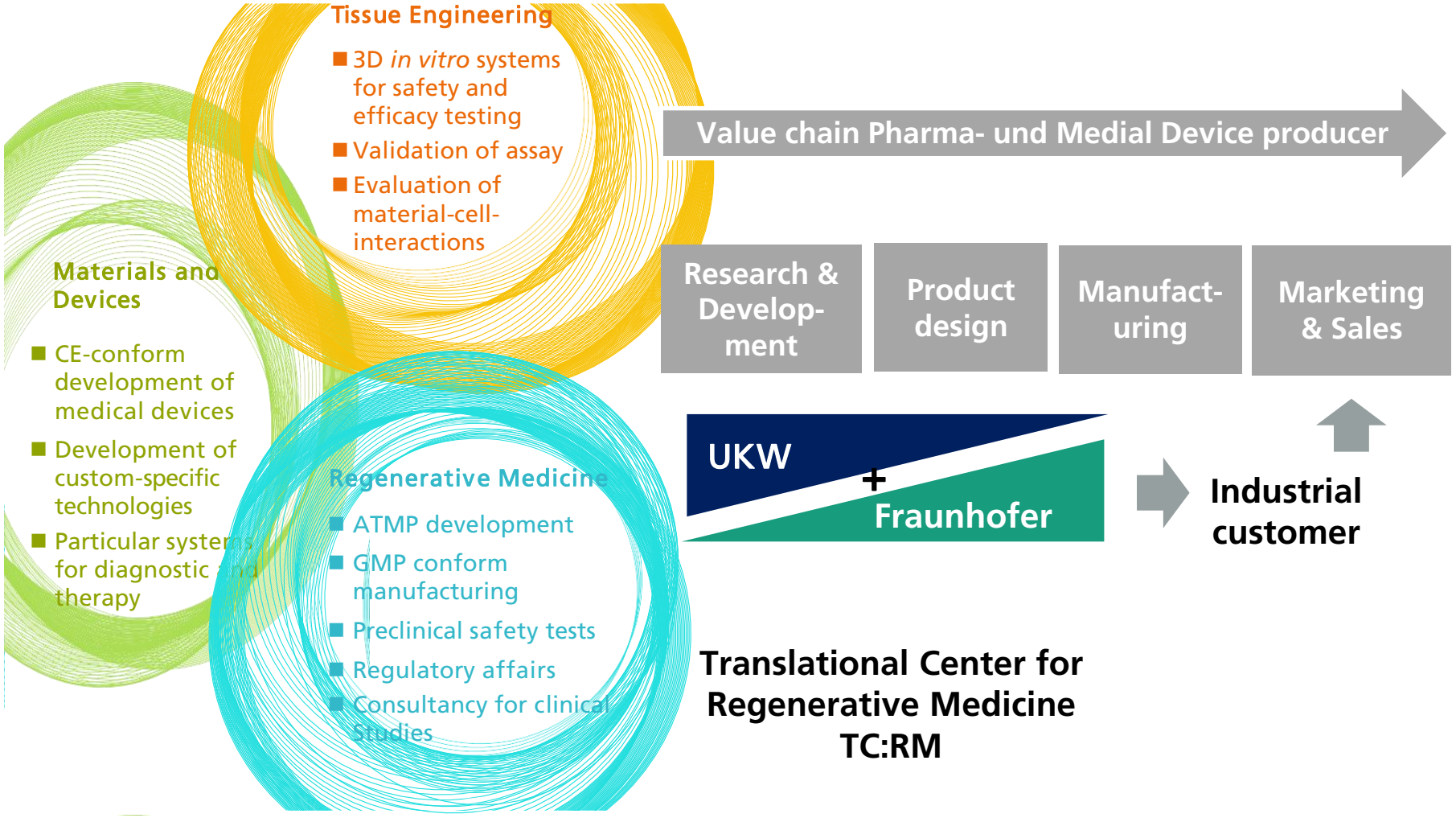


modelling

milling

ORMOCER® crown

TCRM: From biology to medical devices



Julius-Maximilians-UNIVERSITÄT WÜRZBURG

UK

TERM Department Tissue Engineering & Regenerative Medicine

Fraunhofer IGB

Contact

For more information please contact us:

Translational Center "Regenerative Therapies for Oncology and Musculosceletal Diseases"

Business Development

Roentgenring 11, 97070 Wuerzburg, Germany

Phone +49 931 31-88002 | Fax +49 931 31-81068

joris.braspenning@uni-wuerzburg.de
Senior Business Development Manager

angela.rossi@igb.fraunhofer.de
Business Development Manager