

University of Groningen

Exploring combined influences of material topography, stiffness and chemistry on cell behavior at biointerfaces

Zhou, Qihui

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2018

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Zhou, Q. (2018). Exploring combined influences of material topography, stiffness and chemistry on cell behavior at biointerfaces. [Groningen]: Rijksuniversiteit Groningen.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

**Exploring Combined Influences of
Material Topography, Stiffness and
Chemistry on Cell Behavior at
Biointerfaces**

Qihui Zhou

Exploring Combined Influences of Material Topography, Stiffness and Chemistry on Cell Behavior at Biointerfaces

By Qihui Zhou



University Medical Center Groningen, University of Groningen
Groningen, The Netherlands

Copyright © 2018 by Qihui Zhou

Cover designed by Qihui Zhou

Printed by Offpage, Amsterdam, The Netherlands

ISBN (printed version): 978-94-034-0780-7

ISBN (electronic version): 978-94-034-0779-1



**rijksuniversiteit
groningen**

**Exploring Combined Influences of Material
Topography, Stiffness and Chemistry on Cell
Behavior at Biointerfaces**

Proefschrift

ter verkrijging van de graad van doctor aan de
Rijksuniversiteit Groningen
op gezag van de
rector magnificus prof. dr. E. Sterken
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

woensdag 11 juli 2018 om 12.45 uur

door

Qihui Zhou

geboren op 01 februari 1988
te Shandong, China

Promotor

Prof. dr. ir. H.J. Busscher

Copromoter

Dr. P. van Rijn

Beoordelingscommissie

Prof. dr. P.Y.W. Dankers

Prof. dr. R.A. Bank

Prof. dr. ir. E. van der Giessen

To my dearest family

Paranimfen:

Philipp T. Kühn

Gwenda F. Vasse

Table of Contents

Chapter 1	General Introduction	1
	Aim of the Thesis	9
	Outline of the Thesis	10
Chapter 2	Mechanical Properties of Aligned Nanotopographies for Directing Cellular Behavior	15
Chapter 3	Directing Mesenchymal Stem Cells with Gold Nanowire Arrays	37
Chapter 4	Directional Nanotopographic Gradients: a High-throughput Screening Platform for Cell Contact Guidance	55
Chapter 5	Screening Platform for Cell Contact Guidance Based on Inorganic Biomaterial Micro/nanotopographical Gradients	75
Chapter 6	Orthogonal Double Gradient for Determining Combined Influences of Stiffness and Wettability on Mesenchymal Stem Cell Behavior	101
Chapter 7	General Discussion	119
	Summary	124
	Samenvatting	130
	Acknowledgements	136
	Curriculum Vitae and Publications	140

