

論文 / 著書情報
Article / Book Information

題目(和文)	固定化タンパク質ならびに微細加工構造体による細胞機能の制御
Title(English)	REGULATION OF CELLULAR FUNCTIONS BY IMMOBILIZED PROTEINS AND MICRO- FABRICATED STRUCTURES
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出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第12413号, 授与年月日:2023年3月26日, 学位の種別:課程博士, 審査員:芹澤 武,原 正彦,穴戸 厚,大河内 美奈,澤田 敏樹,伊藤 嘉浩
Citation(English)	Degree:Doctor (Engineering), Conferring organization: Tokyo Institute of Technology, Report number:甲第12413号, Conferred date:2023/3/26, Degree Type:Course doctor, Examiner:,,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	要約
Type(English)	Outline

Outline of the thesis

Abstract

List of abbreviation

Chapter 1 General introduction

- Tissue engineering and regenerative medicine strategies
- Matrix (Scaffold)
- Biochemical factors and growth factor immobilization
 - Physical growth factor loading and bioaffinity-based methods
 - Chemical growth factor conjugation
 - New application fields: 3D printing
- Cell source for tissue engineering
 - Stem cell and cell differentiation
 - Redirecting cell fate: reprogramming and trans-differentiation
 - Medical applications and challenges in cell reprogramming
- Tools regulate the cell-cell interaction
 - Development of biological micro-electro-mechanical system (BioMEMS)
 - Microfluidics
- Current situations, identify the gap and limitations
- Scope of the thesis
 - Research aims
 - Composition and objectives of this thesis
- References

Chapter 2 Photo-reactive polymers for immobilization of epidermal growth factor

- Introduction
- Materials and methods
 - Photo-reactive polymers synthesis
 - UV spectroscopy
 - Zeta potential
 - EGF-FITC labelling.
 - Spin coating and UV immobilization
 - Measurement of the thickness of polymers
 - Contact angle measurement
 - Immuno-staining
 - Cell culture
 - Evaluation of attachment and growth of cells
- Results and discussion
 - Photo-reactive polymer characterizations

- Surface fabrication by photo-reactive polymers
- Immobilization of EGF Cell attachment
- Cell growth
- Conclusion
- References

Chapter 3 Microfluidic device for cytoplasmic transfer

- Introduction
- Materials and methods
 - Silicon wafer processing
 - Photoresist spin coating process
 - Photolithography by maskless photolithography system
 - Construction of microfluidics chip
 - Cell culture transfection
 - Cell membrane staining
- Results and discussion
 - Designs and concepts of microfluidic device
 - Fabrication of microfluidic chip mold, replica molding, and assembly
 - Characterization of porous membrane
 - Transfection of fluorescence protein
 - Evaluation of cell trapping unit
 - Cell fusion through microporous membrane
 - Validation of membrane fusion through microdevice
- Conclusion
- References

Chapter 4 Summary and future outlooks

- Summary
- Future outlooks