China Scholarship Council – University Maastricht

PhD Programme Application form

Basic information

- To be filled in by the prospective UM supervisors -

1. Information on prospective UM supervisors and Promotor

1a. First Supervisor/promoter:

- Title(s), initial(s), first name, surname: Dr. S.H. van Rijt
- Research group: Department of Instructive Biomaterials Engineering, MERLN Institute for Technology-Inspired Regenerative Medicine
- Address for correspondence: Universiteitssingel 40, 6229 ER Maastricht, PO Box 616, 6200 MD Maastricht
- Telephone: +31640067508
- E-mail: s.vanrijt@maastrichtuniversity.nl

1b. Second Supervisor/copromoter:

- Title(s), initial(s), first name, surname:
- Research group:
- Address for correspondence:
- Telephone:
- E-mail:

1c. Promotor (if applicable): **– see above**

- Title(s), initial(s), first name, surname:
- Research group:
- Address for correspondence:
- Telephone:
- E-mail:

2. Information on UM Faculty/ Department/ Institute/ School contact person:
When the application is granted by both the CSC and UM, the contact person is responsible for the practical arrangements (i.e. assistance in obtaining a visa, finding accommodation, etc.) of the visit of the PhD candidate:

- Title(s), initial(s), first name, surname: Dr. S.H. van Rijt
- Research group: Department of Instructive Biomaterials Engineering, MERLN Institute for Technology-Inspired Regenerative Medicine
- Address for correspondence: Universiteitssingel 40, 6229 ER Maastricht, PO Box 616, 6200 MD Maastricht
- Telephone: +31640067508
- E-mail: s.vanrijt@maastrichtuniversity.nl

The MERLN institute offers an international and diverse student community. We are currently hosting several CSC students, two currently supervising in my group. The CSC student will be fully embedded within MERLN institute in the nanomaterials group. See our website (https://merlninstitute.com/) for more information about our research, scientists and infrastructure. We are happy to provide the contact details of (some of) our CSC students to provide additional information.

- To be filled in by the applicant if already known –

1. Information on the applicant

- Initial(s), first name, surname:
- Male/female:
- Current work address:

- Telephone:
- E-mail: WeChat:
- Private address:

2. Details of applicant's home university

Note! A separate letter of recommendation by the supervisor or faculty dean of the home university is required.

- Name of home university:
- Address:
- Telephone:
- E-mail:
- Website (if available):

3. Applicant's home university Master Thesis supervisor:

- Title(s), initial(s), first name, surname:
- Address for correspondence:

- Telephone:
- E-mail: WeChat:

4. Research field(s)

前沿技术 / Frontier Technologies

生物技术 / Biotechnology
新材料技术 / Advanced Materials Technology
基础研究 / Basic Research

5. Title of research plan for CSC-UM PhD Programme

Uncovering mechanisms behind stem cell mediated in vivo regeneration using multifunctional nanoprobes

6. Short summary of research plan (max. 250 words) (A full plan has to be submitted later)

Background: Stem cell (SC)-based therapies hold the potential to revolutionize therapeutics by enhancing the body's natural repair process. To optimize clinical outcomes, it is important to understand the biodistribution and behavior of transplanted SCs in complex 3D systems. This knowledge will help us understand stem cells functional capabilities, and the biological role that they play in regenerating tissue. Nanoparticles are promising materials for non-invasive real-time detection of SCs. In particular, gold and mesoporous silica nanoparticles (MSNs) are ideal candidates for these applications because they can efficiently incorporate dyes, have high biocompatibility and, their surface can be easily modified, for example for the attachment of peptides for tissue and cell targeting. Moreover, these nanoparticles can be used as novel theranostic tools to optimize SC treatment by incorporating therapeutic molecules within their mesoporous system.

Study objective: In this project, we will develop novel real-time biosensor tools based on MSNs and gold nanomaterials for tracing stem cell in vivo and in 3D cell cultures. Moreover, we will explore the incorporation of therapeutic molecules to optimize or enhance SC regenerative capabilities. The student will synthesize the nanoprobes and study their interaction with SCs in vitro. In addition, we will perform in vivo stem cell tracing experiments with the new nanoprobes to determine stem cell biodistribution and function by performing various techniques including inductively coupled mass spectrometry (ICP-MS) and fluorescent microscopy. This interdisciplinary project will be performed at the MERLN institute in collaboration with several national and international collaboration partners.

Expected Results: With the nanoparticle imaging probes we expect to obtain new insights on stem cell distribution and on stem cell function and regenerative mechanisms in complex 3D environments.

Requirements: We are looking for a motivated student with good communication skills and background in biomedical research. Experience with cell and molecular biology, imaging and nanomaterial synthesis is a plus.

Group's performance:
Dr. S. van Rijt; Publications: 38; H-Index: 19; number of citations 2156

Recent publications from our group:
- DNA modified MSN-films as versatile biointerfaces to study stem cell adhesion processes X Zhang, S van Rijt. *Colloids and Surfaces B: Biointerfaces,* 2022, 215, 112495 (IF = 5,3)

- Mesoporous Silica-Coated Gold Nanoparticles for Multimodal Imaging and Reactive Oxygen Species Sensing of Stem Cells. C Trayford, D Crosbie, T Rademakers, C van Blitterswijk, R Nuijts, Stefano Ferrari, Pamela Habibovic, Vanessa LaPointe, Mor Dickman, Sabine van Rijt. *ACS applied nano materials* 5 (3), 2022, 3237-3251 (IF= 6,1)

- Calcium Phosphate-Coated and Strontium-Incorporated Mesoporous Silica Nanoparticles Can Effectively Induce Osteogenic Stem Cell Differentiation. P Sutthavas, Z Tahmasebi Birgani, P Habibovic, S van Rijt *Advanced Healthcare Materials,* 2022, 11 (4), 2101588, 3 (IF = 11,1)

- Peptide-Modified Nano-Bioactive Glass for Targeted Immobilization of Native VEGF. M Schumacher, P Habibović, S van Rijt, *ACS applied materials & interfaces*, 2022, 14 (4), 4959-4968 (IF= 10,4)

-Intranasal mesenchymal stem cell therapy to boost myelination after encephalopathy of prematurity. JEG Vaes, CM van Kammen, C Trayford, A van Der Toorn, T Ruhwedel, Manon JNL Benders, Rick M Dijkhuizen, Wiebke Möbius, Sabine H van Rijt, Cora H Nijboer, *Glia*, 2021, 69 (3), 655-680 (IF = 7,5)

7. Motivation for CSC-UM PhD application (max. 250 words)
Two letters are required, one from the student and one from the promotion team.

Applicant's Curriculum Vitae (if available)
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8. Personal details

Applicant
- Title(s), initial(s), first name, surname:

CSC-UM PhD programme start 1-9-2022

- Surname:
- Nationality: Chinese
- Date of Birth:
- Country and place of birth:

9. Master's degree (if applicable)
Note! Add a copy of your Master's degree to your application

University:
Faculty/discipline:
City and country:
Date:
Grade average:
Title Master's thesis (if applicable):
Thesis grade: