# PhD position in

# Analytical Chemistry / Multi-Dimensional Liquid Chromatography

Vrije Universiteit Brussel (www.vub.ac.be) is an internationally oriented university in Brussels, the heart of Europe. Through tailor-made high-quality research and education, VUB wants to contribute in an active and committed way to a better society for tomorrow.

The PhD student will be working in the Eeltink research group in the Department of Chemical Engineering at the Vrije Universiteit Brussel. The main research themes of the group are *i*) Advancing fundamentals of separation science, *ii*) design and development of functionalized monolithic nanomaterials, *iii*) Realizing novel concepts via microfluidic solutions, and *iv*) Developing UHPLC$^n$-MS/MS workflows in support of medical diagnostics.

**PhD research project:**

Multi-dimensional LC methods are especially suitable for the characterization of macromolecules, such as (bio-)polymers and proteins. The PhD project aims at realizing a novel microfluidic modulator chip containing parallel trap segments for sample transfer between columns in a 2D-LC set-up. Such high-tech modulator chip allows to decouple the separations in different dimensions, with the aim to alleviate constraints and allow optimal conditions in each dimension independently. To enhance the detection sensitivity and extent the possible column combinations the incorporation of nested monolithic nanomaterials in the trap segments will be pursued. Furthermore, to mediate the content of organic modifier in the mobile phase, the functionality of the mixer can be enhanced by adding a mixer on-chip. In a later stage, enzymatic microreactors modulator chips will be created for the top-down analysis of biotherapeutics.

Results will be presented at conferences and published in international journals. The PhD student is expected to complete the PhD thesis within 4 years. In addition, the PhD student will contribute to the education program of the university. A research internship is foreseen in the Analytical Chemistry group at the University of Amsterdam of Professor P.J. Schoenmakers

**Collaboration with industry:**

A multi-disciplinary research team from industry and academia has been formed that has complementary capabilities and brings together unique knowledge on separations science, chips technology, mass spectrometry, and applications. The PhD student will work closely together with the Schoenmakers team of the University of Amsterdam and will also conduct research internships within the research labs of Janssen Pharma (BE) and Abundnz (NL). Other industry partners include the Research Institute of Chromatography (RIC, BE), DOW Benelux (NL), and DSM (NL).

**Admission requirements:**

- MSc degree in the field of (Bio)-Analytical Chemistry.
- Strong background and interest in separation science, and life-science research.
- Strong interest in chip technology.
- Very good knowledge in spoken and written English.

**Interested?**

Please send you application letter including your motivation, your CV and grade list, and two letters of recommendation by email to: Prof. Dr. S. Eeltink (seeltink@vub.be). (Closing date for application is 31$^{th}$ of January 2018).

# PhD position in liquid chromatography-mass spectrometry

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The PhD student will be working in the Eeltink research group in the Department of Chemical Engineering at the Vrije Universiteit Brussel. The main research themes of the Eeltink group are *i*) Advancing fundamentals of separation science, *ii*) design and development of functionalized monolithic nanomaterials, *iii*) Realizing novel concepts via microfluidic solutions, and *iv*) Developing UHPLC$^n$-MS/MS workflows in support of post-genomic biotechnology and medical diagnostics.

**PhD research project:**

Recent studies in the field of proteomics have demonstrated that over 80% of proteins exert their function as part of larger assemblies. Interactions between biomolecules have proven to be critical for all levels of cellular function, and hence affect physiological function. Hence, the possibility to identify protein-interaction networks involved in cell regulation provides new opportunities to detect and treat diseases, as new drug targets allowing regulation of multi-protein complexes involved in cell signaling can be developed

The PhD project aims at realizing novel comprehensive multi-dimensional-dimensional liquid-chromatography workflows that maintain protein conformation during analysis, allowing for unprecedented separations, targeting profiling and regulation of biomolecular-interactions networks. The key objectives are:

- Development and performance characterization of novel polymer-monolithic column technologies for high-resolution protein separations, maintaining protein 3D conformation (and biological activity) during analysis.
- Establishing native high-resolution 1D-LC–MS methods (HIC, IEX, and SEC) by hyphenation of the capillary column technology directly to (ion-mobility) mass spectrometry.
- Development of comprehensive two- and three-dimensional LC workflows protocols for unravelling of biomolecular interaction networks, *i.e.* to acquire more accurate information on the chemical composition of biomolecule assemblies directly in contemporary life-science matrices.

Results will be presented at conferences and published in international journals. The PhD student is expected to complete the PhD thesis within 4 years. In addition, the PhD student will contribute to the education program of the university.

A 6 months research internship is foreseen in the Biomolecular Analysis/ Analytical Chemistry group at the VU University (Amsterdam, NL) of Professor G.W Somsen.

**Admission requirements:**

- MSc degree in the field of (analytical) chemistry.
- Strong background and interest in separation science, mass spectrometry, and life-science research.
- Very good knowledge in spoken and written English.

**Interested?**

Please send you application letter, including your motivation to apply, curriculum vitae, grade list, and two letters of recommendation by email to: Prof. Dr. S. Eeltink (seeltink@vub.be). (Closing date for application is 31$^{th}$ of January 2018).

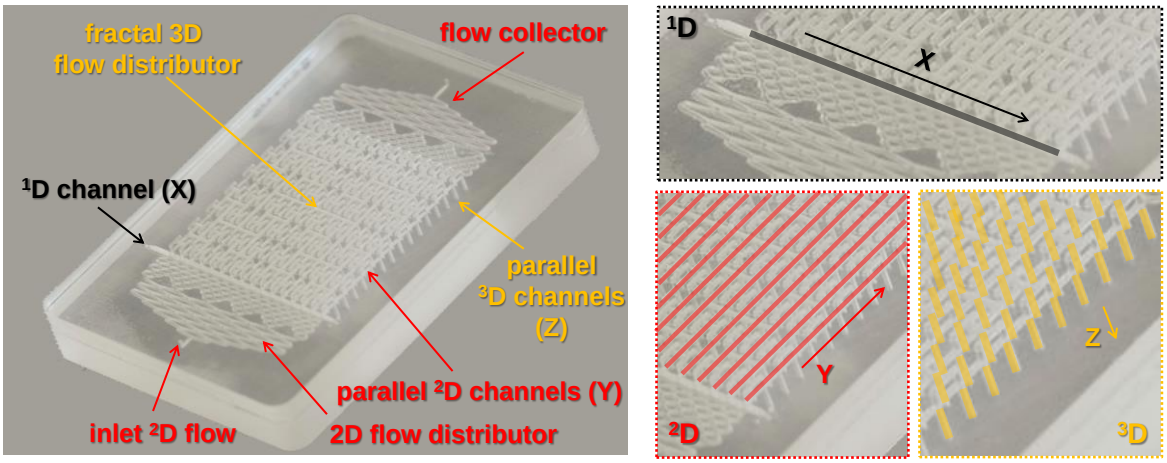
# PhD position (m/f) in microfluidics

Vrije Universiteit Brussel (www.vub.ac.be) is an internationally oriented university in Brussels, the heart of Europe. Through tailor-made high-quality research and education, VUB wants to contribute in an active and committed way to a better society for tomorrow.

The PhD student will be working in the Eeltink research group in the Department of Chemical Engineering at the Vrije Universiteit Brussel. The main research themes of the Eeltink group are *i*) Advancing fundamentals of separation science, *ii*) design and development of functionalized monolithic nanomaterials, *iii*) Realizing novel concepts via microfluidic solutions, and *iv*) Developing UHPLC$^n$-MS/MS workflows in support of post-genomic biotechnology and medical diagnostics.

**PhD research project:**

The PhD student will work on a research project that is aimed at establishing a novel concept: comprehensive spatial three-dimensional chromatography that promises unmatched separation performance. Spatial 3D-LC separations will be performed by making analytes migrate to different positions in a three-dimensional body. The separation of 1,000,000 components can ultimately be realized given that the maximum peak capacity is the product of the three individual peak capacities. Due to parallel analysis in the second and third dimensions the analysis time is greatly reduced, overcoming the fundamental limitation of coupled-column multi-dimensional approaches, in which sampled fractions are analyzed sequentially. For more information see B. Wouters *et al.* Lab on a Chip 15 (2015) 4415-4422.




The main task will be to conduct research developing microfluidic solutions for spatial 3D-LC. Results will be presented at conferences and published in international journals. The PhD student is expected to complete the PhD thesis within 4 years. In addition, the PhD student will contribute to the education program of the university.

**Admission requirements:**

- MSc degree in the field of (analytical) chemistry, material science or a related field.
- Strong background and interest in separation science and chip technology.
- Very good knowledge in spoken and written English.

**Interested?**

Please send you application letter, including your CV and grade list, two letters of recommendation, and a short research project proposal focusing on the development of microfluidic chips for spatial 3D-LC (maximum 2 A4s) by email to: Prof. Dr. S. Eeltink (seeltink@vub.be). (Closing date for application is 8$^{th}$ of January 2018).