

The Research Group

## Analytical, Environmental and Geo-Chemistry

has the honor to invite you to the public defense of the PhD thesis of

**Tara VANDERMARKEN**

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

*Development and implementation of the ERE-CALUX bioassay:  
Assessment of estrogens in the environment and in food  
packaging materials.*

### Promotor:

Prof. dr. Marc Elskens

The defense will take place on

**Tuesday May 29 2018 at 17:00h**

in Auditorium D.0.07 at the campus  
Humanities, Sciences and Engineering of the  
Vrije Universiteit Brussel, Pleinlaan 2 - 1050  
Elsene, and will be followed by a reception.

### Members of the jury:

Prof. dr. Frederik Tielens (chairman)

Prof. dr. Yue Gao (secretary)

Prof. dr. em. Willy Baeyens

Prof. dr. Philippe Claeys

Prof. dr. Luc Leyns

Prof. dr. Marie-Louise Scippo

(Université de Liège)

Dr. Ilse Van Overmeire (WIV-SIP)

### Curriculum vitae

In 2010, Tara Vandermarken graduated as Master of Science in Chemistry at the Vrije Universiteit Brussel. Afterwards, in 2011, she started her PhD research in bioassays and endocrine disrupting compounds at the AMGC research group. This PhD research resulted in thirteen manuscripts, four of which as first author, published in international peer-reviewed journals. Some of her findings even made it to the national media. In addition, Tara supervised four BSc and five MSc students with their thesis research and she taught several practical courses.

### Abstract of the PhD research

Endocrine Disrupting Compounds (EDCs) interfere with the endocrine system leading to adverse health effects (e.g. diabetes, obesity, fertility problems, genital deformations, hormonal cancers, etc.). The prevalence of these diseases is globally increasing, and action should be taken to limit the exposure to EDCs. Not only humans, but also wildlife is suffering from these compounds leading to a decline in their population. EDCs are active at very small doses, even below generally assumed safe levels. Mixture effects, where the combined effect of substances can be greater than the sum of the effects separately, are currently not taken into account. An extra obstacle is that many EDCs are still unknown and even if they are expected to interfere with the hormonal system the legislation is running behind the facts.

This PhD research focused on different important exposure routes and successfully characterized, validated and implemented the ERE-CALUX bioassay. This technique measures unknown estrogenic compounds, as well as mixture effects, in an overall endocrine activity. In indoor dust from kindergartens, a main exposure route for young children, a clear relation was seen between the estrogenic activities and the presence of certain known EDCs. Additionally, some prevention guidelines were setup to minimize the intake of estrogens through indoor dust. Water and sediments of the Zenne, an extremely urbanized river, revealed a potential source of estrogen compounds and natural bacterial communities are able to break down some of the active compounds. For adults, food is a very important exposure route, where food packaging and food contact materials can be relevant sources. Investigation of paperboard shows that recycled fibers have a higher potential in leaking EDCs to food than packaging with virgin (not-recycled) fibers. Finally, plastic baby bottles were also studied where 29 of the 65 possible leaking compounds showing estrogenic activities.