CHALMERS UNIVERSITY OF TECHNOLOGY

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Changing the world of microwaves by hydrogels – a Tracks course.

TRACKS: Tracks aims at learning through cross-disciplinary topics, including students from various backgrounds. In addition, the courses are not fixed to study-periods. For more information about Tracks, see https://student.portal.chalmers.se/sv/chalmersstudier/tracks/Sidor/Tracks.aspx.

SOCIETAL NEED

Microwave technology has a perspective to considerably improve diagnostics and treatment of major societal diseases such as stroke and cancer. Fast and better diagnostics can save and increase the quality of life for patients. Hydrogels have the potential to play an important role in development of next generation of portable micro-wave devices. Hydrogels are semi-solid material, which is comprised of a network and a large amount of solvent. In the case of hydrogels, the solvent is water. Polymers are in our case used as network forming agent.

COURSE TASKS

Hydrogel based materials will be designed and experimentally verified for different applications with use in microwave systems.

The materials can be tailored to fulfill specific functions in antenna arrays such as

- **A coupling media** between body and antenna system to assure an impedance matching and cooling of the body during hyperthermia treatment.
- **An absorbing material** to minimize cross coupling between antennas within an antenna array.
- **Tissue mimicking phantoms** for experimental verification of antenna systems.
- **Antenna miniaturization** enabling antennas to operate at lower frequencies than what their dimensions are dictating for. The antenna arrays can therefore comprise more elements thus providing better spatial resolution then ordinary systems.

Each application utilizes the hydrogels in slightly different way, thus requiring different compositions and properties. Their use also allows for new approaches in the design of microwave antenna systems.

GENERAL INFO

The course is project based. Focus lays on experimental work and simulations with supporting lectures. The findings will be reported in form of a poster and written conference contribution (e.g. abstract).

We welcome students from bachelor or master level from F, K, BT, KF, E, I, M, TD, TM, as well as associated master programs. At least 5 students need to have signed up to start the course. Application is done by mail to Hana and Anna (see mail address below) with CV and motivation letter. Deadlines for application are 18th of October with start 2nd of November and 4th of January, 2021 with start 18th of January. General learning objectives can be found at the TRA100 & TRA105 student portal pages.

Send your questions and/or application to:
Assoc. Prof. Hana Dobsicek Trefna (hanatre@chalmers.se) or Prof. Anna Ström (anna.strom@chalmers.se).