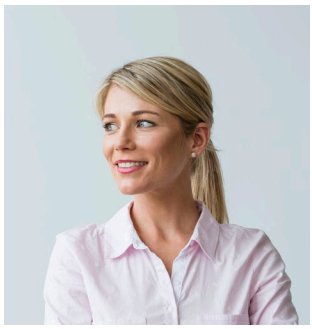
Engineering magnetic nanorobots for medicine

Site specific diagnostics and effective, localized therapy delivery remain challenge tasks in today's medicine. To address this need, my laboratory develops micro- and nanosystems that respond to disease-specific biochemical cues or non-invasive external stimuli like magnetic fields such that they focus their action at the site of disease. In this talk, I describe synthetically engineered systems that are either activated or detected via magnetic fields and can give information about a tumors molecular activity. Moreover, I will show how an individual, synthetic and swarms of living magnetic microbots can help to locally enhance transport of nanodrug shuttles to tissue sites in a model system.



Simone Schuerle, born 1985 in Ulm, Germany, is assistant professor at ETH Zurich, Switzerland, where she heads the Responsive Biomedical System Lab. With her team, she develops diagnostic and therapeutic systems at the nano-and microscale with the aim of tackling a range of challenging problems in medicine. Prior to taking this position, she researched at MIT on nanosensors for *in vivo* tumor profiling as well methods to wirelessly enhance drug transport (2014-2017). She is recipient of several awards, such as the Prix Zonta in 2019 for Women in Science, and fellowships from the SNSF, DAAD and Branco Weiss foundation, and was honored with the distinction of "Young Scientist" by the World Economic Forum (WEF) for her scientific contributions to society. In 2014 she co-founded the spin-off MagnebotiX that offers electromagnetic control systems for wireless micromanipulation. She earned her PhD degree with specialization in microrobotics in 2013 at ETHZ and a masters in industrial engineering with specialization on microsystems and nanotechnology at the Karlsruhe Institute of Technology in Germany.