Research profile for applicants

Name of DKFZ research division/group:	***Smart Technologies for Tumor Therapy (E300) – Prof. Dr. Tian Qiu***
Contact person:	***Nicole Türkowsky*** ***nicole.tuerkowsky@dkfz-heidelberg.de*** *+49 351-31566 81210*
Group homepage: *Visit this website for further information on current research and recent publications.*	***https://www.dkfz.de/en/smart-technologies-for-tumor-therapy***

Please note that this research group is based in Dresden.

RESEARCH PROFILE AND PROJECT TOPICS

Recent technological advancements in micro- and nano-system engineering and robotics open up new possibilities for the next generation of surgical robots: wireless micro-/nano-robots, which can be controlled to navigate in the human body and may be used for various medical applications such as drug delivery and in vivo sensing. Our team succeeded in developing the first nano-robots that can penetrate real tissue – i.e. the vitreous of the eye, and the first miniaturized robot that can be precisely positioned by magneto-oscillatory localization. The group has an exciting ongoing ERC project VIBEBOT (https://cordis.europa.eu/project/id/101041975) to build the first micro-robot that can actively propel and wirelessly sense in deep biological tissues.

The aim of the project is to develop wireless micro-sensors that can detect biochemical clues in the human body. More specifically, they should be able to monitor biomarkers which are released by tumor tissues to enable more precise radiation dosage control during radiotherapy. One potential approach is to use mechanically coupled magnetic elements which are able to vibrate and thereby transmit signals to an external receiver. To evaluate the signal, a physical model of the sensor will be developed to perform precise analysis and to obtain a deep understanding of underlying mechanisms. Knowledge about signal processing, mechatronic prototyping, medical physics and biochemistry will be beneficial, but not mandatory as prerequisite.

The candidate will work at the newly-established DKFZ site Dresden. In Dresden, the DKFZ teams up with the Excellence University TU Dresden, aiming at innovative technology-based approaches for tumor diagnostics and therapy. The project is going to be carried out in the Division “Smart Technologies for Tumor Therapy” led by Prof. Tian Qiu, in close collaboration with the Faculty of Medicine and the Faculty of Electrical and Computer Engineering, TU Dresden

as well as NCT and DKTK in Dresden. The group offers an attractive working environment with interdisciplinary fields including biomedicine, material science.