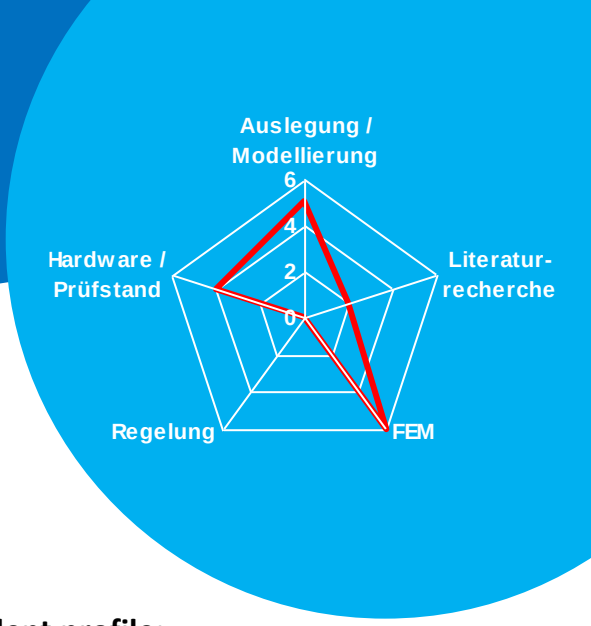
Universität Stuttgart
Institut für Elektrische
Energiewandlung

MA



Modeling and measurement of different core materials for inductors of transcutaneous inductive energy transfer

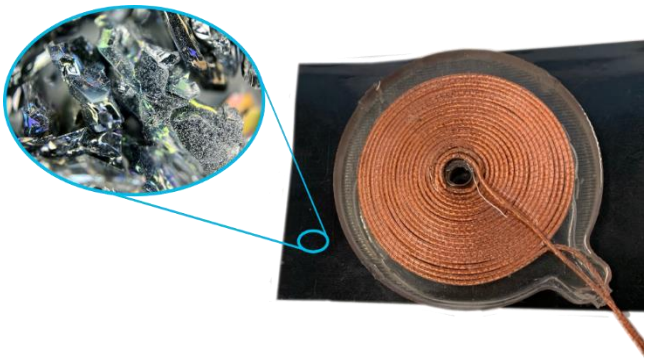
Inductive energy transmission in medical technology is not only used for hearing or visual implants, but also has great potential for systems with higher power consumption, such as heart pumps in the 5-20 W range. Since the use of inserted batteries is not possible here, these implants are currently supplied with energy via a driveline through the abdominal wall.
Transcutaneous energy transmission can reduce the risk of infection for patients and improve their quality of life.
The energy transmission system for a fully implantable ventricular assist device must be designed to be robust and efficient. Cores and shieldings are therefore of central importance. However, it must be taken into account that the used materials have a certain flexibility and that additional losses don't have a counterproductive effect. Suitable materials, including innovative nanocrystalline core materials, are to be investigated for this purpose. The latter could be promising for transcutaneous inductive energy transfer due to their thin-film structure and flexibility.
In this work, these and other promising concepts for the corresponding application should be identified. Their electromagnetic properties are to be modeled as precisely as possible using the COMSOL Multiphysics software. By measuring selected prototypes, their influence on the transformer coils will be determined and compared with simulation results. Thermal effects should also be measured.

Student profile:

- → Independent, careful working style and self-initiative
- → Knowledge of electrodynamics and inductive charging
- → Previous knowledge in the field of FEM modeling, ideally COMSOL Multiphysics
- → Interest in and motivation for practical work

To Do's:

- → Introduction and literature research regarding nanocrystalline and other core materials in the field of inductive charging for medical applications
- → Familiarization with COMSOL Multiphysics
- → Measurement of prototypes with regard to inductance and quality factor
- → System modeling and FEM simulation in COMSOL
- → Thermal measurements of selected topologies
- → Comparison and evaluation of the results



Ansprechpartnerin: Fides Faber fides.faber@iew.uni-stuttgart.de