

BACKGROUND

July 21, 2022 || page 1 | 2

Thomas Gessner Award 2022

Already at SSI 2022 in Grenoble, the Thomas Gessner Award for an outstanding scientific PhD thesis was presented for the third time but for the first time to a scientist of TU Chemnitz. The scientist Dr. Apoorva Sharma, staff member of the Chair of Semiconductor Physics headed by Prof. Dr. D. R. T. Zahn, received the Thomas Gessner Award in Grenoble for his dissertation “Correlation Between the Structural, Optical, and Magnetic Properties of CoFeB and CoFeB Based Magnetic Tunnel Junctions Upon Laser or Oven Annealing”.



Dr. Apoorva Sharma (r.), received the Thomas Gessner Award in Grenoble for his dissertation „Correlation Between the Structural, Optical, and Magnetic Properties of CoFeB and CoFeB Based Magnetic Tunnel Junctions Upon Laser or Oven Annealing“. The award was presented by Prof. Dr. Thomas Otto (l.), chairman of SSI and deputy director of Fraunhofer ENAS.

Photo © Fraunhofer ENAS

Editors

Dr. Martina Vogel | Fraunhofer Institute for Electronic Nano Systems ENAS | Phone +49 371 45001-203 |
Technologie-Campus 3 | 09126 Chemnitz | Germany | www.enas.fraunhofer.de | martina.vogel@enas.fraunhofer.de

The dissertation of Apporva Sharma focuses on investigations of magnetic multi-layer systems for magnetic field sensing. Magnetic field sensors based on spintronic effects, especially the “giant magnetoresistance” (GMR) and “tunneling magnetoresistance” (TMR) effects, are steadily gaining market share due to their performance. In particular, TMR-based systems offer much higher sensitivity, smaller sensor dimensions, and higher energy efficiency, and thus represent a promising technology for the next generation of sensors for industrial environments as well. To maximize the TMR signal, CoFeB/MgO-based sensing elements rely on an annealing step, which serves both to crystallize and to align a reference magnetization in the layered system. In particular, the temperatures required for crystallization of CoFeB are often challenging, including for integration into smart systems or on flexible substrates, as this step is typically performed in a vacuum oven under the influence of an external magnetic field.

The dissertation was carried out as part of a joint project of the Chemnitz University of Technology, the Fraunhofer Institute for Electronic Nano Systems, and the Laser Institute at Mittweida University of Applied Sciences with financial support from the German Research Foundation (project number 28219353). It provides the first proof of concept that laser annealing can be used as an efficient, fast, and reliable direct-write technique for magnetic multilayer systems. From the standpoint of technological progress, this dissertation lays the foundation for laser-induced crystallization of a few nanometers thick magnetic layer buried under the top electrode within a fraction of a second. Thus, laser annealing offers an economical alternative to meet the stringent spatial and thermal budget requirements not only of magnetic field sensors but also of the next generation of magnetic random access memory (MRAM).

A Thomas Gessner Award sponsored by Fraunhofer ENAS will again be presented in 2023. It bears the name of the first director and founder of the Fraunhofer Institute for Electronic Nano Systems ENAS Prof. Dr. Thomas Gessner. The award is addressed to national and international master students and PhD students in the field of Smart Systems Integration, whose final thesis has been evaluated with at least “very good” and does not date back more than two years. The award committee reviews:

- the novelty of the scientific-methodical approach,
- the progress of knowledge,
- the translation of the scientific results into application and proof of commercial success,
- the internationality.