Electrodeposition of magnetic films from room-temperature ionic liquids

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In fields of work of sensor technology, actuating elements, medical engineering and integrated optics microtechnology is of increasing importance. For instance, in microengines ferromagnetic components are required in actuators and rotors[1]. Thin magnetic films are also used in microelectromechanical systems (MEMS)[2]. Magnetic alloys from metals like iron, cobalt, nickel and rare earth metals like samarium fulfil these requirements.

From the classical aqueous electrolytes the electrodeposition of magnetically hard films is mostly difficult. An alternative could be the electrodeposition of metals like Fe, Co, Ni or Sm and their alloys from ionic liquids[3-5].

Recent studies at the **fem** investigated the electrodeposition of Fe, Co and Sm from two different types of ionic liquids (dialkyl-imidazolium- and choline chloride- based electrolytes). Thereby, the influence of the electrodeposition parameters like current density, metal content in the electrolyte and deposition temperature on structure and surface morphology was examined. Electrolyte parameters like electrical conductivity and viscosity were also measured. A high resolution scanning microscope (HRSEM) was used to examine the surface morphology of the metal deposits. Magnetic properties (B_r, H_c) of the prepared metal films were measured by a magnetometer device.

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Sven-Erik Wulf is a Ph.D candidate at the Technical University of Illmenau. His research focuses on the characterization and electrodepositon of magnetic materials for sensor or microelectro-mechanical applications.

Dr. Reinhard Boeck is a senior researcher in the department of electrochemistry at the ***fem*** (the *fem-Forschungsinstitut für Edelmetalle und Metallchemie* is a research institute, which is belonging to the federal state of Baden-Wuerttemberg, Germany). One of his main fields of activity are the micro- and nanostructuring of surfaces for the purpose of producing nanocrystalline thin metal layers with improved magnetic, corrosion and abrasion properties.

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