Translating science into technology in biomaterials science: Strontium functionalized implants

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It is a challenging task to combine University research and education with more specific user-driven goals, e.g. development of novel knowledge based products and processes. With starting point in a specific successful project concerning strontium functionalization of orthopedic implants [1], I will address a few of the special challenges of pushing research results towards commercial utilization and thereby contributing to the development of business and society.

Strontium (Sr) is an alkali earth metal, which is known to be incorporated into the mineral phase of bone. It has been shown that Sr influences bone homeostasis both by inhibiting bone resorption and by increasing bone formation. Sr containing complexes has been used for the treatment of bone loss associated with e.g. osteoporosis. We developed a novel surface modification method aimed at creating a thin coating tailored for a sustained release of strontium. The coatings were prepared by a Physical Vapor Deposition (PVD) magnetron co-sputtering process and selected on the basis of Sr-release data in PBS buffer quantified by inductively coupled plasma optical emission spectroscopy (ICP-OES). A rodent study (Wistar rats) showed a significant increase in direct bone-to-implant contact and peri-implant bone volume four weeks after implantation for several of the Sr modified implant groups as compared to commercially pure grade 4 titanium, which served as reference.
This example will demonstrate that is it possible for PhD students to combine peer-reviewed articles and patents during the studies and a career in the industry.

REFERENCES: [1] O. Z. Andersen et al. (2013) Accelerated bone ingrowth by local delivery of strontium from surface functionalized titanium Implants, *Biomaterials* **34**: 5883-5890.