



# EINLADUNG

zum Vortrag von

**Prof. Thomas J. Webster, Ph.D.**

Hebei University of Technology (China), Saveetha University (India), UFPI  
(Brazil), and Brown University (USA)

## The Future of Biomaterials: Nanotechnology, Implantable Sensors, 4D Printing, Artificial Intelligence, and More

**am Dienstag, 12. Dezember 2023, um 17:30 Uhr**

**Ort:** Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,  
1090 Wien, Strudlhofgasse 4 / Boltzmannngasse 5, 1. Stock

*Barrierefreier Zugang: Boltzmannngasse 5, Lift, 1. Stock rechts über den Gang zum  
Hintereingang des Hörsaals*

### **Abstract:**

While biomaterials research has exploded exponentially over the past several decades, little has changed in terms of medically-approved products. In fact, the thousands of hip implants inserted today are essentially the same as that developed in the 1960s by Sir Charnley. This presentation will highlight some recent advances in biomaterials destined to become (or have been already been) approved by regulatory agencies and incorporated into healthcare. For example, this talk will cover how spinal implants with nanotextured surface features have been implanted into over 20,000 patients to date with no cases of implant failure (no infection, no bone non-unions, no loosening, etc.) whereas the industry standard is 5-10% implant failure. Artificial Intelligence (AI) will also be a focus of this presentation as AI is being used with nanomedicine to further improve disease prevention, detection, and therapy. Specifically, efforts to design implantable sensors that monitor human health, communicate human health to a hand-held device, and respond on-demand to reverse adverse health events will be presented. Research will also be presented concerning how AI is being used to develop nanoscale surface features that inhibit bacteria, limit inflammation, and promote tissue growth on any medical device. Further, commercialization efforts will be reviewed which are using AI to interpret nanoscale temperature profiles to enable hand-held devices to diagnose infection or inflammation after implant surgery by the patient themselves. 3D printed materials which change shape remotely and on-demand after insertion (so called 4D printed materials) will also be covered in which such materials can revolution scoliosis and other disease treatment. In summary, this presentation will cover technologies that hopefully will allow us to finally move beyond implants originally discovered last century and are still being used this century.

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### **CHEMISCH-PHYSIKALISCHE GESELLSCHAFT**

c/o Universität Wien, Fakultät für Physik, 1090 Wien, Boltzmannngasse 5, Austria

Generalsekretär: Christl Langstadlinger

Tel.: +43-(0)1-4277/51108 - Mobil: 0664-60277 51108

E-Mail: [christl.langstadlinger@univie.ac.at](mailto:christl.langstadlinger@univie.ac.at) - <http://www.cpg.univie.ac.at>

ZVR-Zahl: 513907440

Konto: Bank Austria - IBAN: AT22 1100 0086 4440 8000 - BIC: BKAUATWW