



## Unleashing the Potential of Materials



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Materials are akin to air in that they fundamentally underpin human life. As scientists, we are tasked with contributing to humanity by creating a sustainable society by means of **generating innovative functional materials** that overwhelm conventional concepts. We pioneer new academic domains accompanying **creation of emergent functional materials and device**, as well as various measurement approaches including the practical use of **NanoTerasu synchrotron facility**.

1. Interatomic spacing is the most fundamental determinant for the characteristics of condensed matters. If one can reversibly induce significant interatomic spacing modulation, one can endow materials with novel properties and functions. We put emphasis on the **nanometer thin films** that can be stretchable. Concentrating on magnetism, that is, spin physics, we propose novel principles for controlling material properties, and advance understanding of background science utilizing NanoTerasu, which finally leads to the development of **innovative mechanical sensing technologies** for societal implementation. Through these efforts, we will pioneer new academic domains of "spin-elatronics" and ultimately "**nano-elatronics**".
2. Whereas Nano-magnetic materials are used for information recording, we exploit their magnetic interactions to realize "**nano-magnet that behave intelligently**". For instance, we are developing devices without power capable of sensing forces, storing the information, and performing calculations.
3. Through initiatives 1 and 2, we will dramatically expand the scope of **societal implementation** for spintronics, bringing about a game-changer in this field. Simultaneously, we will contribute to the advancement of measurement and control techniques. We will pioneer new use cases, vigorously promoting the integration of NanoTerasu synchrotron radiation and other measurement methods, as well as the **digital transformation of measurement and control**.

Strain vector sensing

Vital motion sensing

Magnetic logic gate

Film-type strain gauge with  
the world's highest sensitivity

Integrated spin cyber  
physical system

