

ナノ材料科学 (中山 知信) Nanomaterials Science (NAKAYAMA Tomonobu)



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ナノ材料を活用する脳型情報処理

過去数十年に渡るナノスケールの物質・材料の研究は、多くの興味深いナノ材料を生み出しました。今、我々はナノ材料を連結したナノシステムを作り上げ、新しい機能を生み出す段階に来ています。ナノシステムが目指す方向の一つに、脳型の情報処理をこなす材料システムの開発があります。これは、生物の脳に発現する学習・記憶・連想といった高度な機能を、非生物材料から成るナノシステムに持たせようというものです。生体材料を使わずに、生物物性を再現する代表的なシステムはロボット、すなわち機械システムでしょう。最近、シナプスの動作を模倣するデバイスも現れ、ソフトウェアの助けを借りずに思考するシステムの実現は、着実に近づいています。当研究室では、ナノ材料の物性やナノシステムの挙動をナノテクノロジーを駆使して計測し、その生物機能類似性に着目します。機械システムに人間性を与え、脳科学の進展にも貢献する脳型ナノシステムと一緒に開発しましょう。

Brain-type information processing with nanoscale materials

The research of nanoscale materials over the past few decades has yielded many interesting materials and structures. We are now at the stage of creating nanosystems for emerging new functions by linking such nanomaterials. One of the directions that nanosystems aim for is the development of materials systems that handle brain-type information processing. This is to give high-level functions, such as learning, memorization and associative thinking realized by the biological brains, to nanosystems made of non-biological materials. A typical system that reproduces biological properties without using biomaterials is a robot, namely mechanical system. Recently, devices that mimic synaptic plasticity have also appeared, and the realization of systems that think without software assistance is steadily approaching. In our laboratory, we measure physical properties of materials at the nanoscale and behavior of nanosystems at macroscopic scales with a help of the state-of-the-art nanotechnology and focus on their similarities to biological functions. Let's develop brain-like nanosystems that gives humanity to mechanical systems and also contributes to the advancement of brain science.

