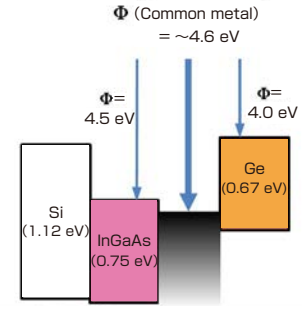
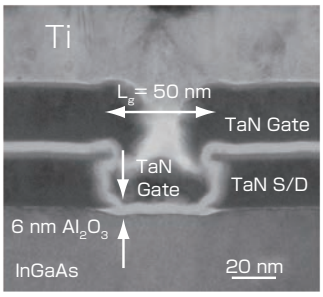
First demonstration of ultra-small III-V/Ge CMOS transistors

A breakthrough technology for next generation high-performance CMOS transistors of different alternative channel materials

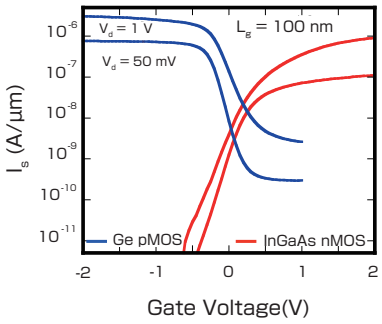
We have proposed the alternative channel materials and a new engineering process in order to realize next generation high-performance CMOS transistors for 16 nm generation. We have developed a scalable III-V/Ge CMOS technology with common metal source/drain and gate electrodes, and III-V/Ge CMOS operation with gate length of less than 100 nm has been verified for the first time.



Band lineup of InGaAs and Ge



Cross-sectional TEM image of InGaAs nMOSFET with the gate length of 50 nm



Electrical transport properties of InGaAs/Ge n/pMOSFET (Lg=100 nm)

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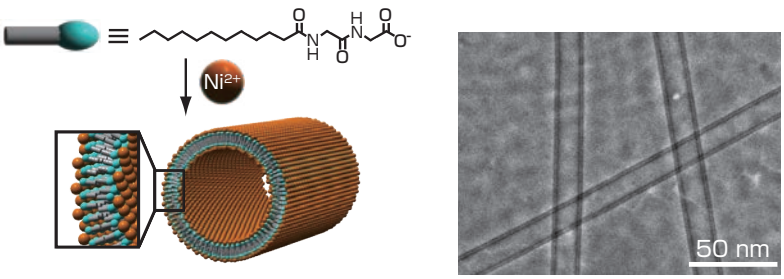
New recyclable green catalyst

Efficient catalyst for oxidation reaction using metal-complex-type organic nanotubes

We have discovered that nickel-complex-type organic nanotubes (Ni-ONTs) function as the catalyst for oxidation reactions of various organic compounds, indispensable for industries, in water at room temperature. Ni-ONTs were synthesized by the mass production method developed by AIST. Ni-ONT can be synthesized by the simple operation of mixing inexpensive an amphiphilic molecule, glycylglycine connected with a fatty acid, and nickel salt in solvents. Because all nickel ions are exposed on the inside and the outside surfaces of the nanotube, Ni-ONT is expected to provide excellent catalytic sites. Since Ni-ONT is solid in water, it can be easily recovered through filtration after catalytic reactions and is also recyclable. Therefore, Ni-ONT is expected to contribute to green innovation.



Schematic illustration and electron microscope image of Ni-ONT

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