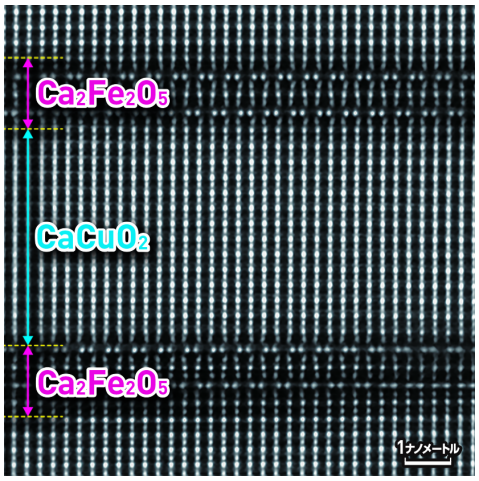
High-precision atomic layering to create new superconductors

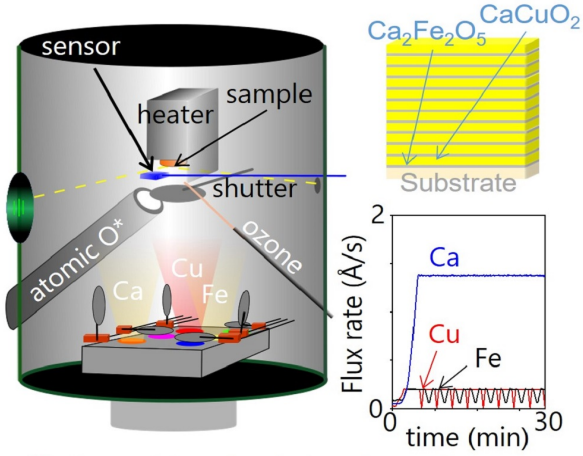


Background

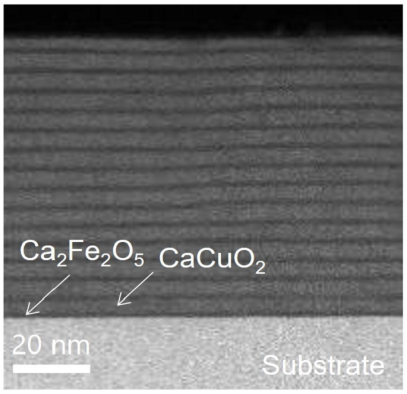
There have been only a few examples of novel cuprate superconductors created by means of artificial superlattices due to their structural complexity. Our advanced thin-film growth technology enabled to overcome this problem and we have been creating novel cuprate superconductors with this approach.

Summary

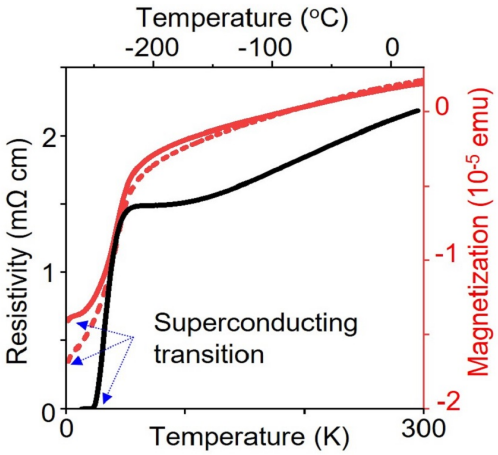
Using our custom-designed thin film growth apparatus, we prepared a superlattice whose structure mimics that of cuprate superconductors and found that this new superlattice is a superconductor. This discovery holds promise for the creation of further new superconductors using our approach.



High-precision atomic layering system



Fabricated superconducting superlattices



Superconducting transition observed in $CaCuO_2/Ca_2Fe_2O_5$ superlattices

Features

- High-quality complex oxide superlattice fabrication technology with high-precision and simultaneous flux-rate control of multiple cations together with elemental source sequencing
- Element-distinctive and atomic-resolution imaging technology based on scanning transmission electron microscopy providing guidelines for designing superconducting superlattices
- Physical property measurement techniques revealing superconductivity of novel materials

Future_benefits

Superconducting states at ambient temperature and pressure would lead to loss-less power transmission and circuit wiring as well as low-cooling-load maglev trains and detectors.

Exhibiting Company

NIPPON TELEGRAPH AND TELEPHONE CORPORATION

Contact

rdforum-exhibition@ml.ntt.com