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Titel des Beitrags:
The remarkable difference between
surface and step atoms in the
magnetic anisotropy of
two-dimensional nanostructures

Abstract:
The original magnetic properties of
nanometre-sized particles are due to
the distinct contributions of volume,
surface and step atoms. To
disentangle these contributions is an
ongoing challenge of materials
science. Here we introduce a method
enabling the identification of the
remarkably different contributions of
surface and perimeter atoms to the
magnetic anisotropy energy of
two-dimensional nanostructures. Our
method uses the generally nonlinear
relationship between perimeter length
and surface area. Atomic-scale
characterization of the morphology of
ensembles of polydisperse
nanostructures, combined with in situ
measurements of their
temperature-dependent magnetic
susceptibility, gives access to the role
played by the differently coordinated
atoms. We show for Co
nanostructures on a Pt(111) surface
that their uniaxial out-of-plane
magnetization is entirely caused by
edge atoms having 20 times more
anisotropy energy than their bulk and
surface counterparts. Identification of
the role of perimeter and surface
atoms opens up unprecedented
opportunities for materials
engineering. As an example, we
separately tune magnetic hardness
and moment in bimetallic core-shell
nanostructures.

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