

## ***In situ* U-Pb geochronology and Hf isotope analyses of the ultra-high temperature metapelite from Mather Peninsula, east Antarctica**

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U-Pb zircon geochronology from an ultra-high temperature (UHT, ~1000 °C) granulite-facies metapelite from the Rauer Group, Mather Peninsula, east Antarctica, has yielded evidence for two episodes of metamorphic zircon growth, at ~1.00 Ga and ~530 Ma, and two episodes of magmatism in the source region for the protolith sediment, at ~2.53 and ~2.65 Ga, were identified from the zircon cores. Successive zircon growth at ~1.00 Ga and ~530 Ma records a sequence of distinct, widely spaced high-temperature metamorphic and/or anatexis events related to Grenvillian and Pan-African orogenesis. These metamorphic events in rock from Rauer Group can be correlated with events previously reported for the adjacent southern Prydz Bay and northern Prince Charles Mountains. These Archean zircon cores have oscillatory growth zoning and possess  $\epsilon_{\text{Hf}}$  values between -10 and +4, suggesting derivation of their precursor magmas from old crust and juvenile materials from mantle. The metamorphic domains have negative  $\epsilon_{\text{Hf}}$  values, this means that Archean crust was remelted to generate these domains. The metamorphic effect on zircon Lu-Hf and U-Pb isotope systems in UHT metapelite will be evaluated.  $T_{\text{DM}}^{\text{Hf}}$  ages from cores of zircon grains indicate the metapelite rocks share a ca. 2.65-3.36 Ga source that is indistinguishable from that previously reported for parts of the Rauer Group. This study presents the robust geochronological evidence for the timing of UHT metamorphism of the Rauer Group, supporting arguments that the peak UHT metamorphic event occurred at ~1.00 Ga and was overprinted by a separate high-grade event at ~530 Ma.

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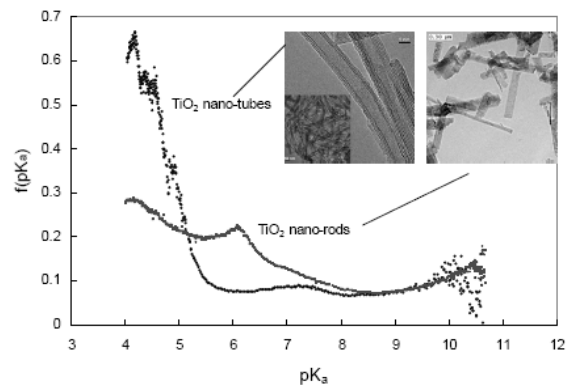
## **Surface chemistry and stability of nanostructured materials in natural aquatic environments**

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It recently becomes a concern that large-scale use of nanomaterials may pose unforeseen environmental risks. The mobility of nanomaterials in natural aquatic environments is an important parameter for risk assessments of these materials. Like natural colloids, nanomaterials released into aquatic environments will experience a sequence of transformations including coagulation, settling, and filtration, which will ultimately control the bioavailability of these materials. The key factors controlling the mobility of these materials are chemical properties of particle surfaces including the point of zero charge (PZC), acidity constant, and sorption capability. It is possible to predict these properties based on the underlying nanostructures. The control of nanostructures on surface chemistry can be demonstrated with Ti oxides. Nanotubes and nano-rods of Ti oxides exhibit a significant difference in surface acidity in spite of the similarity in composition.



**Figure 1:** Distributions of surface acidity constants of Ti oxides.

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