The evidences of the Initial broken for the Shangdan Ocean: Geochronology and geochemistry of the Muqitan Formation, in North Qinling

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The Muqitan ophiolitic mélange found within the Muqitan Formation near Muqitan region, the North Qinling Orogen. They mainly consist of amphibolite with minor meta-gabbro and meta-chert. Zircon LA-ICP-MS U-Pb dating yields an age of 762.5±4.6Ma for the amphibolites, interpreted as crystallization time, The amphibolites are characterized by low TiO_2 (0.57%~2.16%), relatively low K_2O/Na_2O ratios (0.06~0.55) and moderate-high Mg# (45.3~68.7). They are geochemically similar to low-Ti tholeiites. The Muqitan amphibolites have low REE contents, with differentiated LREE/HREE patterns and no Eu anomalies on the chondrite-normalized REE diagram, analogies to E-MORB. The amphibolites display an enrich elements Rb, Ba,Th, and La pattern, low ($^{87}Sr/^{86}Sr$)i ratios of 0.7038 to 0.7040 and high εNd(t) values of +4.1 to +6.9, suggesting a mantle origin, similar in composition to FOZO-like source. Their (Th/Nb)N, Nb/La and Ba/La ratio features indicate that these amphibolite have been experienced varying degrees of crustal contamination. All these data, combined with the regional geological features demonstrate that the Muqitan amphibolites are interpreted as remnants of the Shangdan ancient oceanic crust that would have formed during the inception of the oceanic open at ca. 762.5 ±4.6Ma.

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Deposition and remobilization of oxidized multiwalled carbon nanotubes on silica surfaces: Implications for environmental fate and transport

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Carbon nanotubes (CNTs) are increasingly used in commercial and industrial applications because of their superior mechanical and electronic properties. With CNT-containing products already available in the market, it is inevitable that some CNTs will be released into natural aquatic systems. In order to predict the fate and transport of CNTs in surface water and groundwater systems, it is important to understand the interaction between CNTs and natural surfaces. In this study, we investigate the deposition and remobilization of oxidized multiwalled carbon nanotubes (MWNTs) on silica surfaces with a quartz crystal microbalance with dissipation monitoring (QCM-D). The distributions of oxygen-containing surface functional groups for two MWNTs are determined using X-ray photoelectron spectroscopy in conjunction with vapor phase chemical derivatization. Deposition kinetics of lowly oxidized MWNTs (LO-MWNTs) and highly oxidized MWNTs (HO-MWNTs) are compared in monovalent (NaCl) and divalent ($CaCl_2$) electrolytes. HO-MWNTs are found to be more stable to deposition than LO-MWNTs in the presence of NaCl. However, in the presence of $CaCl_2$, the attachment efficiency profiles of both MWNTs are comparable, which is possibly due to Ca^{2+} cations having a higher affinity to form complexes with adjacent carboxyl groups on HO-MWNTs than with isolated carboxyl groups on LO-MWNTs. Additionally, the deposited MWNTs can be released from silica surfaces when they are rinsed with low ionic strength solutions, indicating that the deposition of MWNTs is not always irreversible. The degree of nanotube release is observed to be dependent on the ionic strength and pH of rinsing solutions.