Precise U–Pb zircon CA-ID-TIMS ages and Sr isotopes for the Plana pluton, Srednogorie, Bulgaria

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We report new, high precision CA-ID-TIMS U–Pb single zircon ages for the Plana pluton, a part of the ABTS belt in SE Europe. The pluton is located at the Central Srednogorie - Rhodopes border, ~60km SE of Sofia. *in situ* differentiation of high potassium calc alkaline magmas produced gradually varying rock compositions [1]. We analyzed a granite from the central parts of the pluton (A); and a monzogabbro-diorite from the periphery of the pluton (B).

The three youngest grains in (A) overlap and yield a weighted mean 206Pb/238U age of 77.87±0.07 Ma (2σ, MSWD=1.01), our best estimate for the crystallization age of the granite. Two zircons, interpreted as antecrysts, are concordant at ~78 Ma. The remaining two grains, interpreted as xenocrysts, are concordant at ~440 Ma. In (B), two of five grains are concordant at ~440 Ma; the remaining three zircons are discordant and older. Ages of ~440 Ma, are also reported for inherited zircons in other Upper Cretaceous intrusives and Variscan granitoids from Central and Eastern Srednogorie [2, 3, 4]. The presence of inherited zircons provides direct evidence for wall-rock assimilation.

Comparison of our data with published U-Pb ages [3, 5] suggests that the Plana pluton crystallized in the late stages of Upper Cretaceous magmatism in Srednogorie. Initial Sr isotopes of seven studied rocks are between 0.7043 and 0.7050, within the range of the least radiogenic Upper Cretaceous rocks in the Srednogorie region. Studies from Central Srednogorie show a trend toward younger and more mantle-influenced magmatism from north to south [5]. Our high precision 77.87 Ma age, and the mantle-dominated Sr isotope signature of the rocks, correlate the Plana pluton with the magmatic activity of southern Central Srednogorie.

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Colloidal properties of biomineralized nanoselenium: implications for bioremediation, resource recovery and environmental transport

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Microbial selenium (Se) bioremediation is based on conversion of water soluble, toxic Se oxyanions to water insoluble, biogenic pure elemental Se of particle sizes in the nanometer range (bioNSe). The colloidal stability of the bioNSe suspensions hamper a straightforward removal and recovery by gravitational settling. BioNSe that is not removed from suspension may leave bioremediation reactors with the effluent and is subject to transport and re-oxidation to the original toxic oxyanions. For the first time, colloidal stability fields of pure bioNPSe were determined by electrophoretic mobility (ζ-potential) measurements[1] and column settling experiments (ICP-MS). It was demonstrated that circumneutral pH, commonly applied in bioremediation, prevents settling of bioNPSe, since the particles are strongly negatively charged. Counter cations and protons were used to screen efficiently this intrinsic negative charge. In this manner, settling could be significantly accelerated (up to 86.2 ± 3.5% within 0.5 h) at cation concentrations that would only increase overall treatment costs to minor extents. The ζ-potential measurements showed furthermore, that significantly dissimilar transport behaviour is to be expected in different natural waters (salt, dissolved organic matter rich), which can result in accumulation of Se in certain environments, if bioNPSe leaves bioremediation reactors.

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