

# The genesis of I- and S-type granitoid rocks of the Early Ordovician Oledo pluton, Central Iberian Zone (Central Portugal)

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The Early Ordovician Oledo pluton intruded a Cambrian schist-metagraywacke complex and consists of four distinct granodioritic to granitic phases, G1-G4. ID-TIMS U-Pb ages for zircon and monazite from these granitic rocks indicate emplacements within a short period of time at 479 - 480 Ma. Granodiorite G1 is the most deformed rock with shear zones and deformation at the border. G1 and G3 contain fine-grained biotite tonalite and biotite granodiorite microgranular enclaves, showing rounded or ovoid shapes, some of them irregular and having sharp, occasionally crenulated and diffuse contacts. Microgranular enclaves (ME) and granitic rocks are peraluminous ( $A/CNK=1.0$  to  $1.2$ ), and contain quartz, albite-labradorite, K-feldspar, biotite, zircon, apatite, monazite and ilmenite. Muscovite was found in most rocks and amphibole, titanite, allanite and magnetite also occur in ME and host G1. ME are darker and richer in mafic minerals than the host granodiorites. The geological, mineralogical, geochemical and Sr, Nd and O isotopic data show that tonalitic and granodioritic enclaves and host G1 are of I-type and were related predominantly by a fractional crystallization process. Least-square analysis of major elements and modelling of trace elements indicate that granodioritic enclaves and host G1 could be derived from the tonalitic enclave magma by fractional crystallization of plagioclase, grunerite, biotite and ilmenite. Granodiorite G2 is of hybrid origin. Most variation diagrams for granodioritic enclaves and host G3 granodiorite and their biotites show linear trends. Modelling of major and trace elements of granodioritic enclaves indicate that they result from mixing of a relatively primitive granodiorite magma with a magma derived from crustal melting. Tonalitic enclaves correspond to globules of a more mafic relatively primitive magma. Granite G4 has the most pronounced crustal signature and is of S-type.