

# **Dating mafic igneous rocks using anatase U-Pb geochronometry: An example from lamprophyre in Qinling Orogen, central China**

RUOYU WU<sup>1</sup>, SHOUYU CHEN<sup>2</sup> AND SIYUAN LI<sup>3</sup>

<sup>1</sup>China University of Geosciences, Wuhan

<sup>2</sup>Faculty of Earth Resources, China University of Geosciences

<sup>3</sup>School of Earth Resources, China University of Geosciences, Wuhan 430074, China

Presenting Author: ruoyuwu@cug.edu.cn

Accurate dating ultramafic-mafic magmatism has long been a primary issue in geochronological and petrological study. Zircon U-Pb chronometer, which are commonly used to date intermediate to felsic igneous rocks, is not applicable in dating ultramafic-mafic rocks, in which zircon is rare or absent. Anatase, a polymorph variant of  $\text{TiO}_2$ , is a common U-bearing mineral in mafic igneous rocks, as such, it is a potential U-Pb geochronometer for dating mafic magmatism. However, it has been largely neglected as a U-Pb chronometer. In-situ laser ablation-inductively coupled plasma mass spectrometry (ICP-MS) U-Pb dating of anatase and apatite from a lamprophyre dike in the Qinling-Dabie Orogen demonstrate the suitability and reliability of the anatase in accurately dating magmatic processes. U-Pb dating of magmatic apatite and anatase in the lamprophyres were determined under the same analytical instrument and conditions. NIST 610 standard glass and the RMJG rutile standard were used as external standards for anatase U-Pb dating. Anatase in the lamprophyre are transparent or blue irregular granular with weak grease luster, and some are dipyrarnidal crystals, which yield U-Pb ages of  $137.5 \pm 1.1\text{Ma}$  (MSWD=1.6, n=33), consistent with a U-Pb apatite date of  $136.0 \pm 7.3\text{Ma}$  (MSWD=1.4, n=36). The consistency between the anatase and apatite U-Pb dates confirms the reliability and accuracy of anatase U-Pb dating. Given the occurrence of anatase in ultramafic-mafic igneous rocks, our results highlight the potential utilization of anatase as a powerful U-Pb geochronometer for dating ultramafic-mafic magmatism.