In situ ^{190}Pt-^{4}He dating of platinum mineralization

O.V. YAKUBOVICH [1,2*], M. DANIŠÍK [3], A.G. MOCHALOV[1], B. MCDONALD [3], S.F. SLUZHENIKIN [4],

N. J. EVANS [3], B.I.A. MCINNES [3]

[1] IPGG RAS, Makarova, 2, 199034, Saint-Petersburg, Russia (*correspondence: olya.v.yakubovich@gmail.com)

[2] SPSU, Universitetskaya 7/9, 199034, Saint-Petersburg, Russia

[3] JdLC, Curtin University, Kent Street, Bentley, WA 6102, Perth, Australia (M.Danisik@curtin.edu.au)

[4] IGEM RAS, Staromonetniy 35, 119017, Moscow, Russia

Recent advances in the understanding of the behavior of radiogenic helium (^{4}He) in metals mean that isotopic systems involving α-decay can be applied to radiometric dating of native metal mineralization [1-2]. The observed strong retention of helium in native metals formed the basis of a new ^{190}Pt-^{4}He dating method [3]. Successful application of the ^{190}Pt-^{4}He method for dating platinum mineralization has been demonstrated on isoferroplatinum (Pt_3Fe) and sperrylite ($PtAs_2$) [4].

The ^{190}Pt-^{4}He method has significant potential for applications in mineral exploration, however, further development using bulk helium extraction techniques is complicated by the fact that large (often >500 μm), inclusions-free nuggets of native minerals of platinum are rare.

In situ ^{190}Pt-^{4}He dating approaches, utilizing 'cold ablation' excimer laser helium extraction, may provide a potential solution to this problem. The *in situ* approach, in addition to allowing the targeting of specific sub-grain areas, avoids the need for an α-ejection correction that may potentially introduce an important source of error affecting the accuracy of the results.

We report on *in situ* ^{190}Pt-^{4}He dating of well-characterised Pt minerals from mineralized localities in Russia. Analysis was carried out on a RESOchron [5,6]. which utilizes a 193nm eximer laser, ultra-high vacuum cell and gas handling line, in addition to a quadrupole ICP-MS.

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