

Compositional variations in natural goethite and other oxy-hydroxides in supergene ore deposits.

LICIA SANTORO¹, RICHARD HERRINGTON², NICOLA MONDILLO³, FRANCESCO PUTZOLU⁴

¹ Natural History Museum, UK. l.santoro@nhm.ac.uk

² Natural History Museum, UK. r.herrington@nhm.ac.uk

³ Università di Napoli, IT nicola.mondillo@unina.it

⁴ Università di Napoli, IT francescoputzolu91@libero.it

Goethite is the most thermodynamically stable mineral among the Iron-Oxi-Hydroxide (IOH) phases and is ubiquitous in rocks and soils formed in oxidising conditions. Goethite commonly occurs in gossan of Supergene Ore Deposits (SOD), where it is rarely chemically pure. In fact, a range of metal cations, isovalent or heterovalent to Fe³⁺, can be incorporated into the α -FeOOH structure. Moreover, in many environments, goethite is commonly intergrown and mixed with ferrihydrite coating grain surfaces, and mixed with hematite and minor maghemite.

The aim of this work was to establish the geochemical, morphological and mineralogical variations of natural goethite collected from a diverse range of SOD in order to assess which metals are routinely incorporated into natural goethite. The samples were collected from the Fe-oxide zones of Ni-laterite deposits (Caldag and Karacam, Turkey; Wingellina, Australia), supergene Zn-nonsulfides (Hakkari, Turkey; Jabali, Yemen) and bauxite (Dragoni, Italy; Loupian, France).

The analyses were carried out using a diversity of methods: ICP-AES, XRD, SEM-EDS, EPMA, LA-ICPMS). The preliminary results show that a series of minor and trace elements are hosted within goethite that are different according to the type of the deposit. Silicon is a ubiquitous component in goethite, regardless of deposit type.