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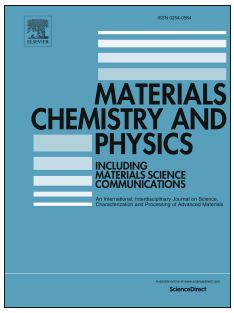

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Wei Li, Qian Wang, Xionghan Feng, Wenfeng Tan, Lirong Zheng, Hui Yin, Fan Liu

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The distinct effects of isomorphous substitution of various divalence trace metals on hematite structure

Wei Li[a], Qian Wang[a], Xionghan Feng[a], Wenfeng Tan[a], Lirong Zheng[b], Hui Yin[a], Fan Liu[a]

[a] Key Laboratory of Arable Land Conservation (Middle and Lower Reaches of Yangtse River) Ministry of Agriculture, College of Resources and Environment, Huazhong Agricultural University, Wuhan 430070, PR China

[b] Beijing Synchrotron Radiation Facility, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China

Abstract:

To provide a better knowledge of the mechanisms by which trace metals associate with and affect the structure of hematite, series of Mn-, Cu-, Ni-substituted hematite samples were synthesized and characterized by Powder X-ray diffraction (XRD) and extended X-ray absorption fine structure (EXAFS). The results show that the incorporation of Mn, Ni, Cu into the structure of hematite changes the cell parameters of hematite due to the different radii between these trace metals and Fe^{3+}. The isomorphous substitution of trace metal ions with different radius from Fe^{3+}, either larger or smaller than Fe^{3+}, will both cause increase in the ratio of the face-sharing Fe-Fe coordination distance to edge-sharing Fe-Fe distance, but through the distinct underlying mechanisms.