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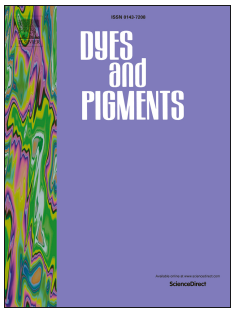

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PII: S0143-7208(18)31351-2

DOI: 10.1016/j.dyepig.2018.07.039

Reference: DYPI 6893

To appear in: *Dyes and Pigments*

Received Date: 17 June 2018

Revised Date: 20 July 2018

Accepted Date: 21 July 2018

Please cite this article as: Gramm G, Fuhrmann G, Wieser M, Schottenberger H, Huppertz H, Environmentally benign inorganic red pigments based on tetragonal β-Bi_2O_3, *Dyes and Pigments* (2018), doi: 10.1016/j.dyepig.2018.07.039.

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Environmentally benign inorganic red pigments based on tetragonal β-Bi_2O_3

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Abstract

This paper reports on the synthesis, characterization, and optical properties of a new class of environmentally friendly red pigments based on the tetragonal β-phase of Bi_2O_3. Stabilization of the metastable β-phase at room temperature has been successfully achieved through incorporation of various metal cations (M = Y^{3+}, Zr^{4+}, Eu^{3+}, Nb^{5+}). Doping with zirconia (Zr^{4+}) yielded compounds showing the most promising red color coordinates (a^* > 30) with the best value provided by the composition. Subsequently, this specific intermediate of the β-phase was further reacted with FeOOH to generate, under preservation of the β-Bi_2O_3-type structure, a red product with the formula $(Bi_{1.95}Zr_{0.05})_{0.8}Fe_{0.4}O_{3+\delta}$. With color coordinates of L^* = 49.9, a^* = 31.1, and b^* = 25.8, the newly developed pigment has been found to be supe-

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