

Accepted Manuscript

Title: Unusual observation of optical property of V^{5+} substituted BPO_4 and its tunable redox features

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PII: S0025-5408(16)30556-6
DOI: <http://dx.doi.org/doi:10.1016/j.materresbull.2017.03.020>
Reference: MRB 9212

To appear in: *MRB*

Received date: 12-8-2016
Revised date: 13-2-2017
Accepted date: 11-3-2017

Please cite this article as: Buvaneswari Gopal, Aishwarya Muralidharan, Rangarajan Bakthavatsalam, Subramanian Nellaiappan, Annamalai Senthil Kumar, Unusual observation of optical property of V^{5+} substituted BPO_4 and its tunable redox features, Materials Research Bulletin <http://dx.doi.org/10.1016/j.materresbull.2017.03.020>

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Unusual observation of optical property of V^{5+} substituted BPO_4 and its tunable redox features

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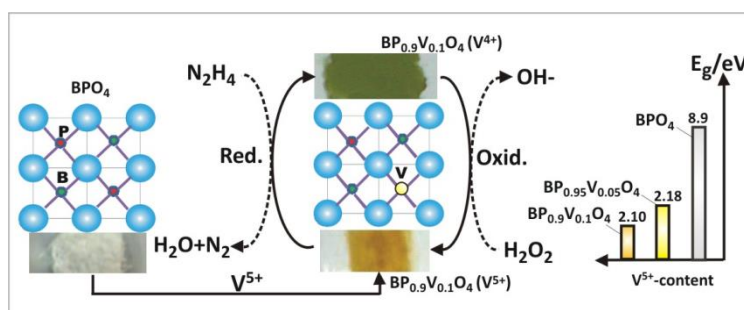
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Graphical abstract



V^{5+} ion substitution results in an unusual reduction in the optical band gap of BPO_4 from ~ 8.9 eV to the value of ~ 2.2 eV ($BP_{1-x}V_xO_4$, $x = 0.05$ and 0.1). The newly developed phosphovanadates ($BP_{0.95}V_{0.05}O_4$ and $BP_{0.9}V_{0.1}O_4$) show absorbance edge in the visible region, possess stable yellow color and exhibit tunable redox features.

Highlights

- (i) Partial substitution of V^{5+} ion for P^{5+} in BPO_4 hugely reduces the band gap of BPO_4 from 8.9 eV to the order of 2.2 eV.
- (ii) The phosphovanadates colorimetrically detect hydrazine and hydrogen peroxide.

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