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Synthesize and characterisation of optical properties of a down-converting Y₂O₃ phosphor co-doped with Bi³⁺ and Yb³⁺.

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Abstract content
   (Max 300 words)
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Special chars

For silicon (Si) solar cells, phosphor materials are necessary for the conversion of ultraviolet (UV) to near-infrared (NIR) radiation. The emission of more than one NIR photon for each UV photon absorbed was demonstrated using a down-converting Y₂O₃ phosphor co-doped with Bi³⁺ and Yb³⁺. Synthesis of Bi³⁺ and Yb³⁺ co-doped Y₂O₃ phosphor was accomplished by using the co-precipitation method with varying the pH levels of the obtained solution. The influence of pH on the crystal structure, luminescent properties and the size and morphology of the particles were investigated using x-ray diffraction, photoluminescence and scanning electron microscopy. Strong NIR emission was observed at around 1 m. The strong NIR emission at around 1 m, under UV excitation, was due to the 2F5/2 to 2F7/2 transition of Yb³⁺ as a result of energy transfer from Bi³⁺ to Yb³⁺ ions. An energy transfer mechanism was proposed and will be presented. This phosphor proves to be promising for enhancing the efficiency of c-Si solar cells.

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