Mixing phosphors to improve the temperature measuring quality.

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Streszczenie

Using luminescent materials for temperature measuring is considered the perspective remote technique nowa-days. Designing new materials which combine a wide operating range with satisfying relative thermal sensitivity (Sr) and temperature uncertainty values is still a challenge. In this paper, we study the luminescence properties and thermometric performance of a mixture of two phosphors. These are Ga-modified garnets - Y3(Al3Ga2) O12:0.1%Pr and Y3(Al1Ga4)O12:0.1%Pr - already reported as dual-mode luminescent thermometers. We show a new concept to improve important thermometric parameters of luminescence thermometers. We prove that such a mixture offers a significantly flatter course of the relative thermal sensitivity vs. temperature with Sr around 1% Kover a broad temperature interval. Independently of which of the thermometric parameter is used, tem-perature measurement may be easily executed in the broad range of temperatures, 15–675 K. At the core of our concept is the use of two phosphors of the same crystal structure. This allows for the equally effective excitation of the two components of the mixture, while both use the same activator.

Słowa kluczowe

luminescence thermometry, mixed phosphors, Dual-mode thermometer, Bandgap engineering, YAG, Pr3+

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