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**Results and discussion:** 



Figure S1a Representative X-ray diffraction patterns of YBO<sub>3</sub>:Eu<sup>3+</sup> sample recorded at different temperatures during heating experiments



Figure S1b Representative X-ray diffraction patterns of YBO<sub>3</sub>:Eu<sup>3+</sup> sample recorded at different temperatures during cooling experiments



Figure S2 The intensity ratio R/O as a function of temperature.



Figure S3 The intensity ratio R/O as a function of pressure.