Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting info

Probing the local structure of the near-infrared emitting persistent phosphor $LiGa_5O_8:Cr^{3+}$

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Results: XRD reference patterns

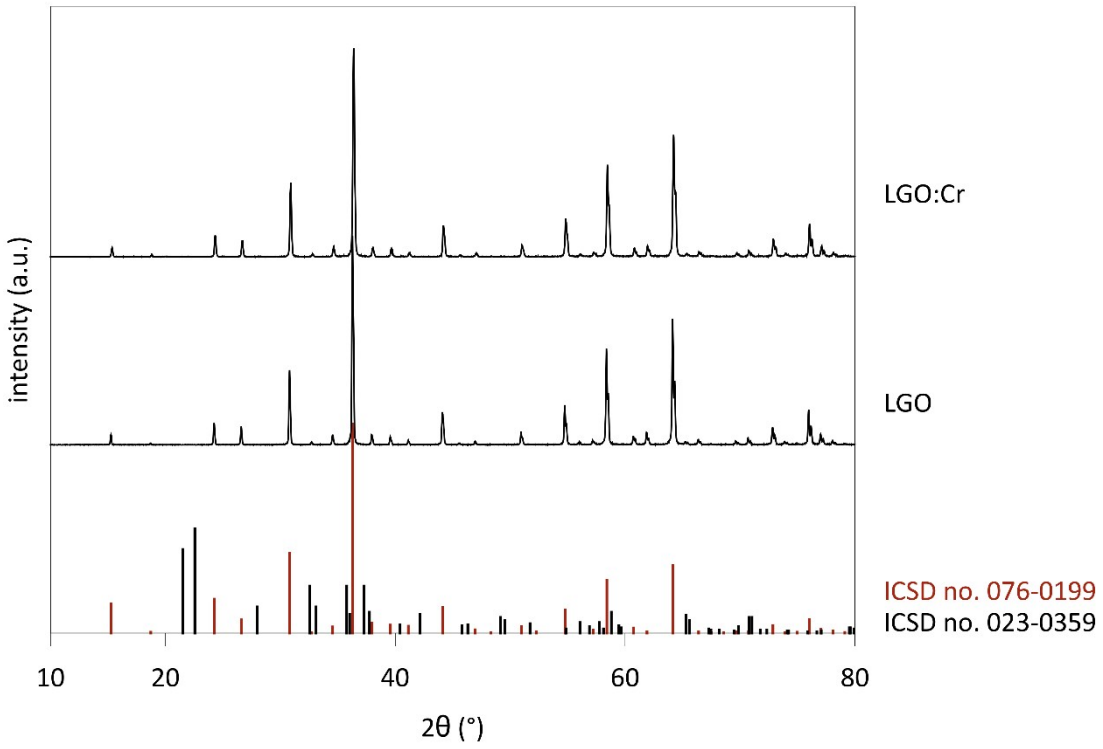

Figure S1: XRD patterns of LGO and LGO:Cr, compared with reference patterns for the $P4_332$ space group of $LiGa_5O_8$ (ICSD no. 076-0199, red) and the $Pna2_1$ space group of $LiGaO_2$ (ICSD no. 023-0359, black). No $LiGaO_2$ phase can be detected in the samples.

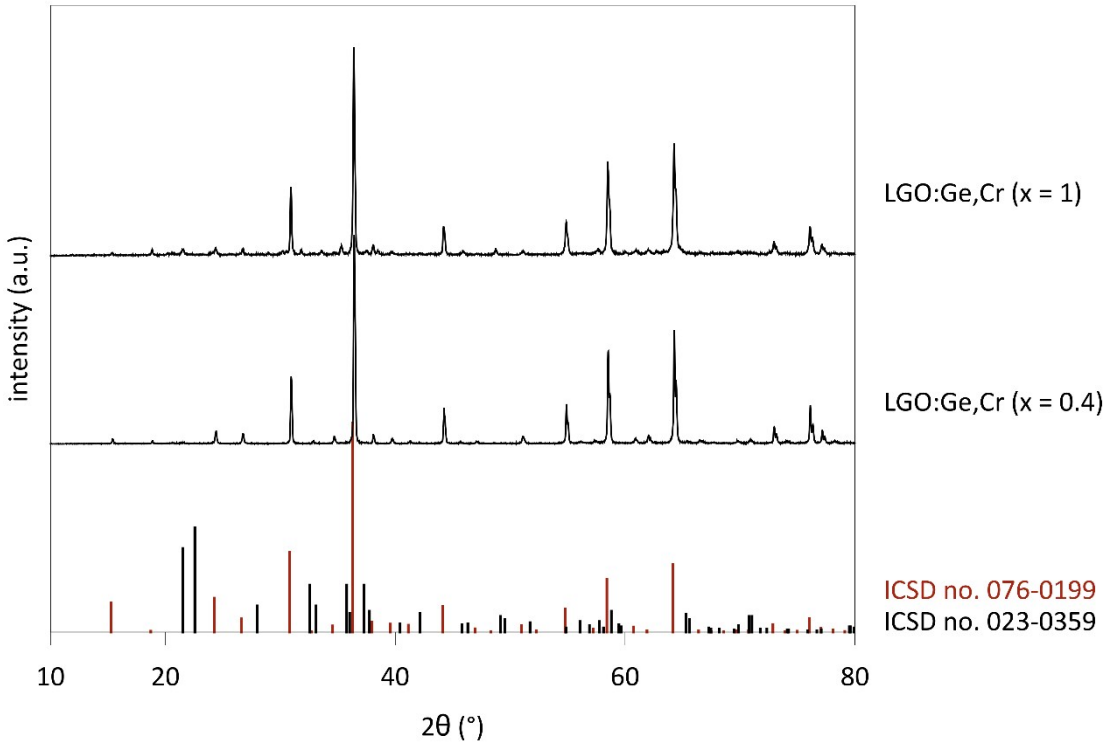

Figure S2: XRD patterns of LGO:Ge,Cr (x=0.4 , x = 1), compared with reference patterns for the $P4_332$ space group of $LiGa_5O_8$ (ICSD no. 076-0199, red) and the $Pna2_1$ space group of $LiGaO_2$ (ICSD no. 023-0359, black). No $LiGaO_2$ phase can be detected. Small amounts of Ge-containing side phase are present in the x = 1 sample only.

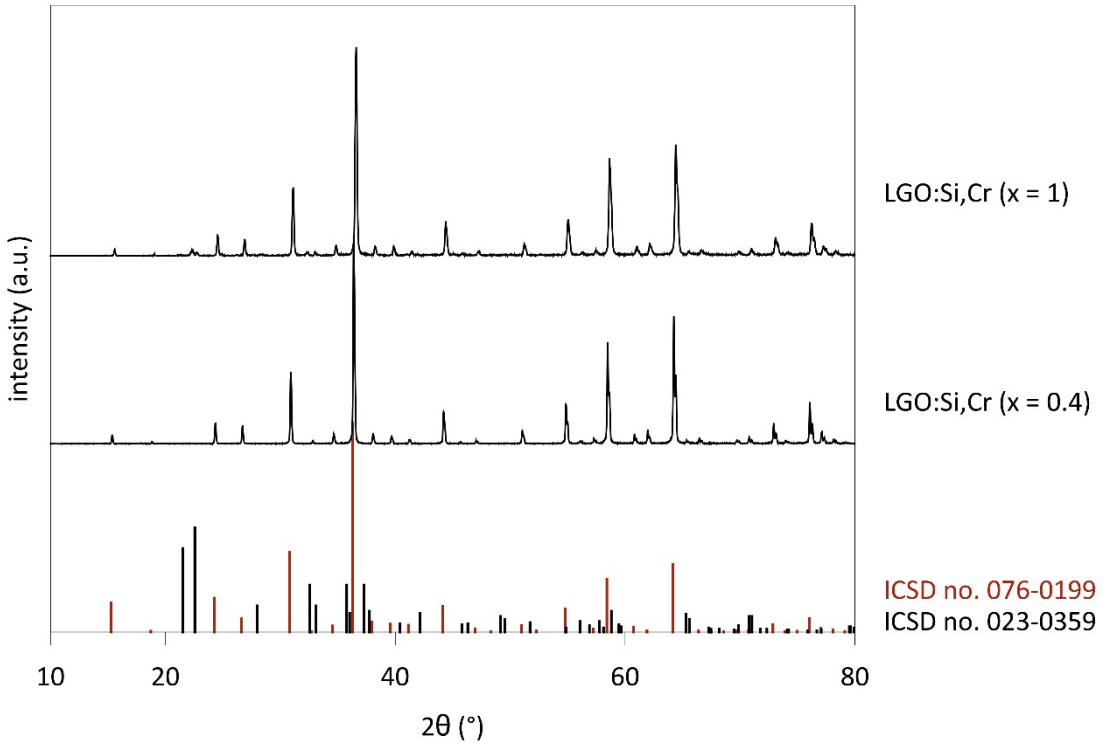

Figure S3: XRD patterns of LGO:Si,Cr (x=0.4 , x = 1), compared with reference patterns for the $P4_332$ space group of $LiGa_5O_8$ (ICSD no. 076-0199, red) and the $Pna2_1$ space group of $LiGaO_2$ (ICSD no. 023-0359, black). No $LiGaO_2$ phase can be detected. Small amounts of Si-containing side phase are present in the x = 1 sample only.

Results: SEM-EDX mappings

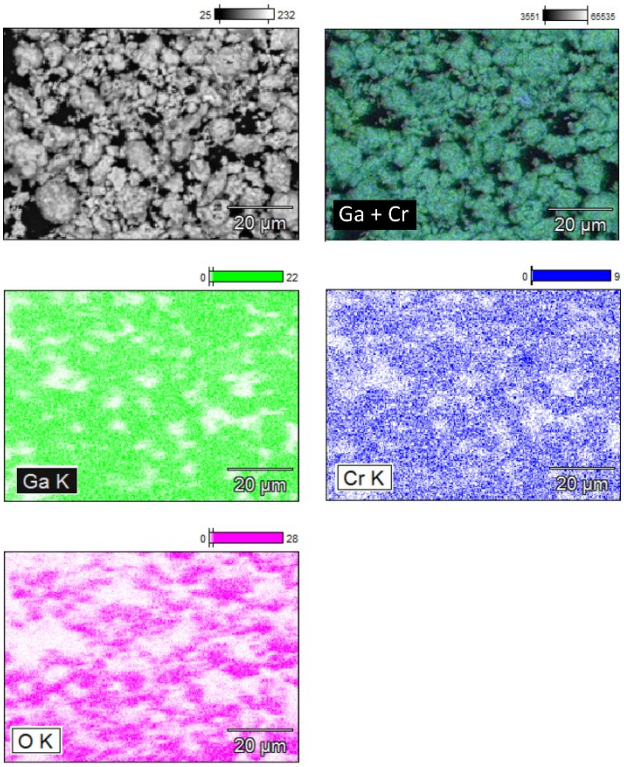

Figure S4: SEM image of LGO:Cr powder and EDX mappings of Ga (green), Cr (blue) and O (pink) signals and composite map of Ga and Cr.

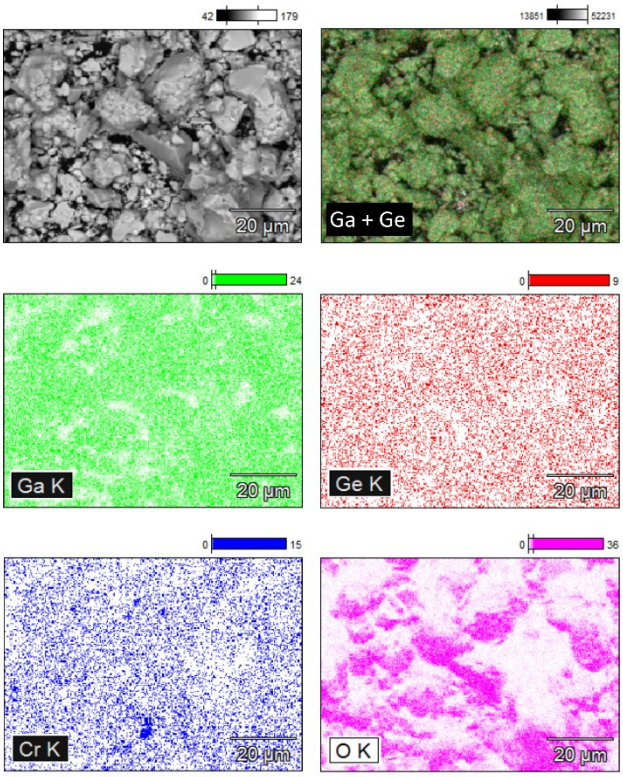

Figure S5: SEM image of LGO:Ge,Cr (x = 0.4) powder and EDX mappings of Ga (green), Ge (red), Cr (blue) and O (pink) signals and composite map of Ga and Ge.

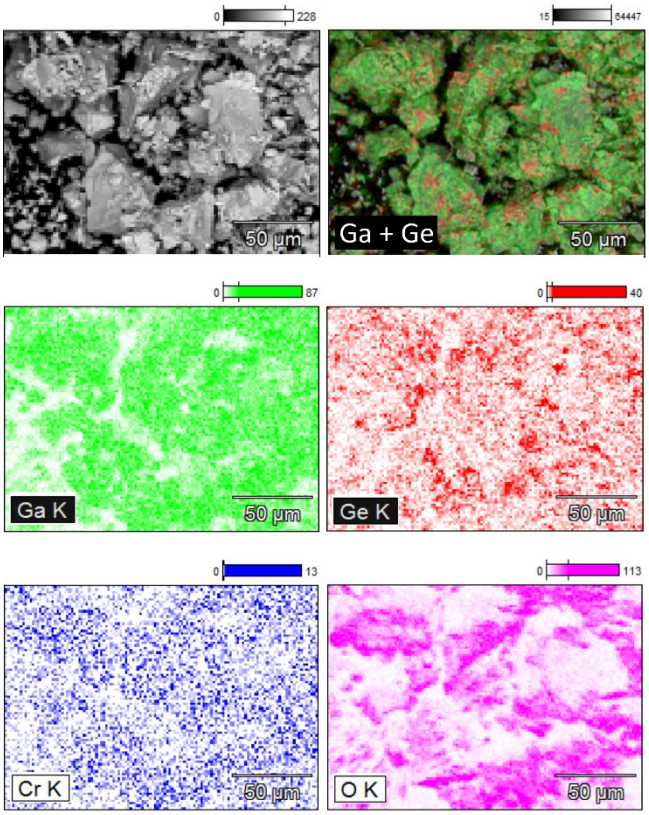

Figure S6: SEM image of LGO:Ge,Cr (x = 1) powder and EDX mappings of Ga (green), Ge (red), Cr (blue) and O (pink) signals and composite map of Ga and Ge. Clustering of Ge is evident from this composite map.

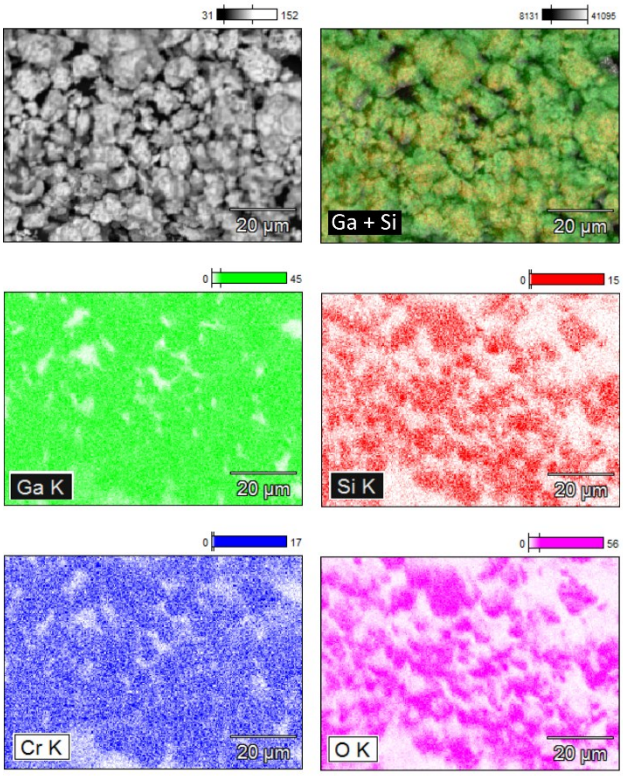

Figure S7: SEM image of LGO:Si,Cr (x = 0.4) powder and EDX mappings of Ga (green), Si (red), Cr (blue) and O (pink) signals and composite map of Ga and Ge.

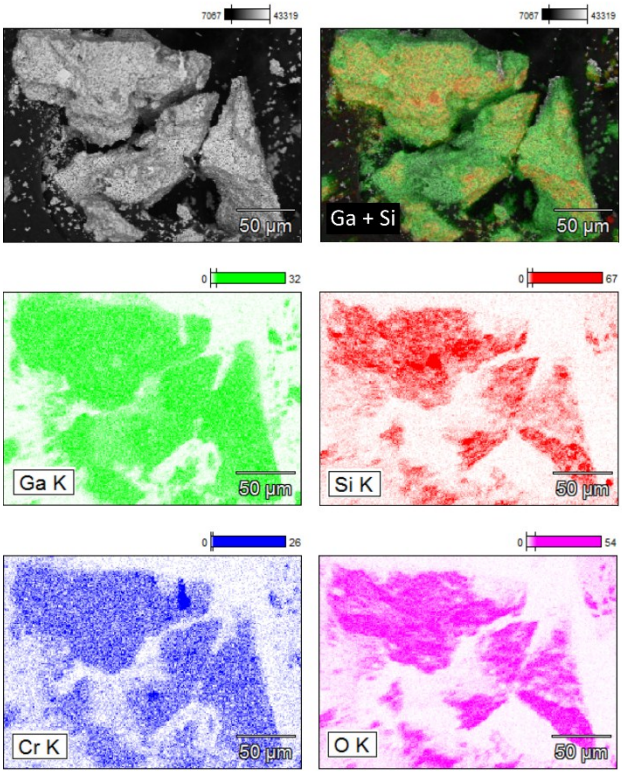

Figure S8: SEM image of LGO:Si,Cr (x = 1) powder and EDX mappings of Ga (green), Si (red), Cr (blue) and O (pink) signals and composite map of Ga and Ge. Clustering of Si is evident from this composite map.

NOTE

All SEM images and EDX mappings were taken at a low oxygen pressure of 20 Pa. This results in larger oxygen signals than expected from stoichiometry.

Results: Diffuse reflectance measurements

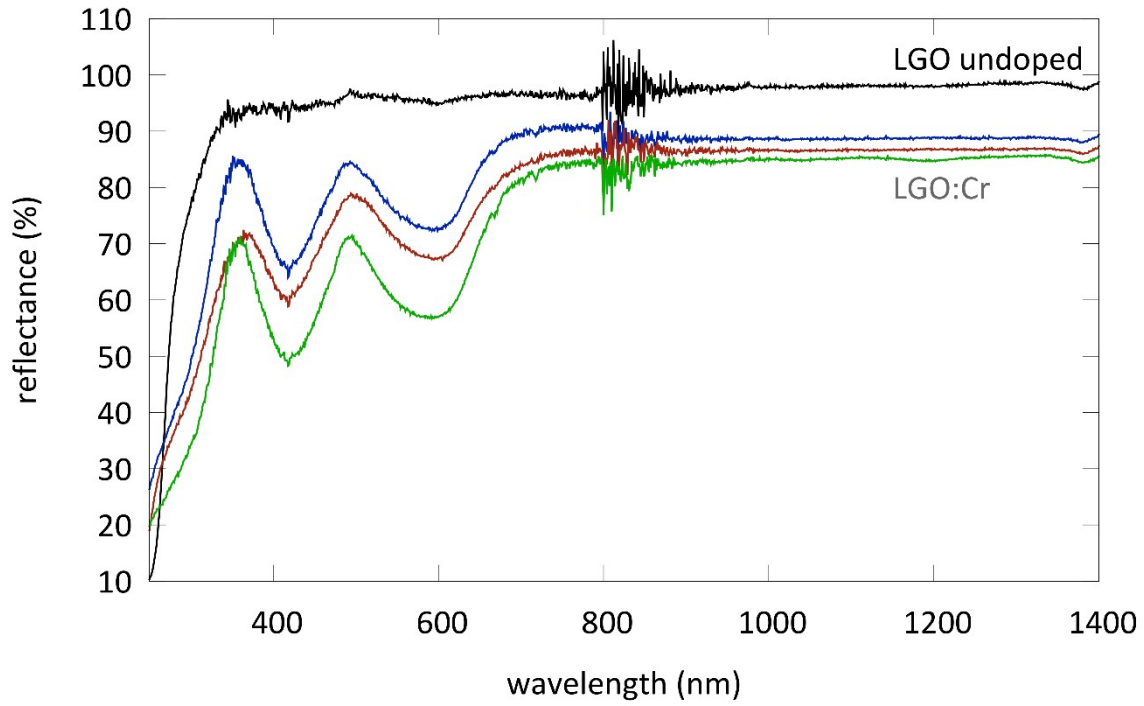

Figure S9: Diffuse reflectance spectra of undoped LGO and selected LGO:Cr samples. The optical transitions of Cr^{3+} are visible below 300 nm, and at 410 and 600 nm. The noise between 800 and 900 nm is due to the changing of detectors in the spectrometer.

Results: Radioluminescence

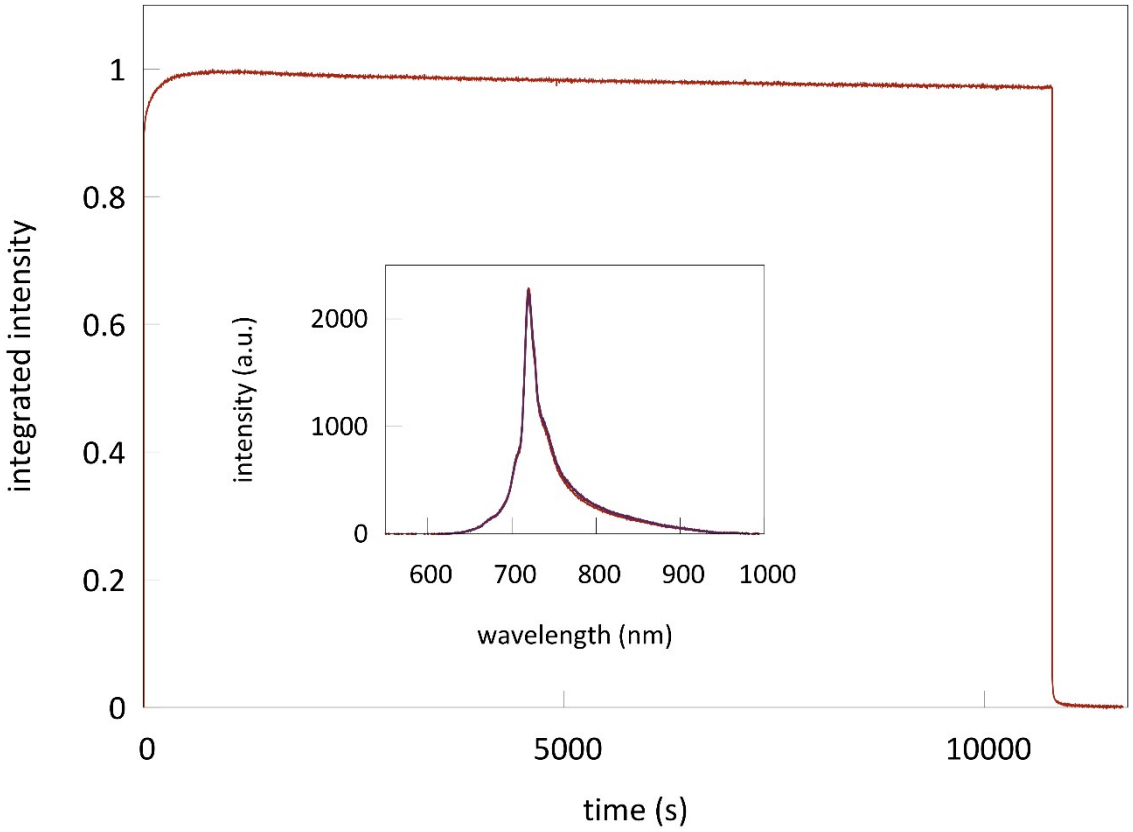

Figure S10: Integrated emission intensity as a function of time, during X-Ray irradiation of LGO:Cr. The emission intensity does only decrease 2 % over the course of 3 h. Inset: emission spectrum of LGO:Cr, when excited via full spectrum Cu-anode X-rays.