Near Infrared Persistent Phosphors for In Vivo Imaging

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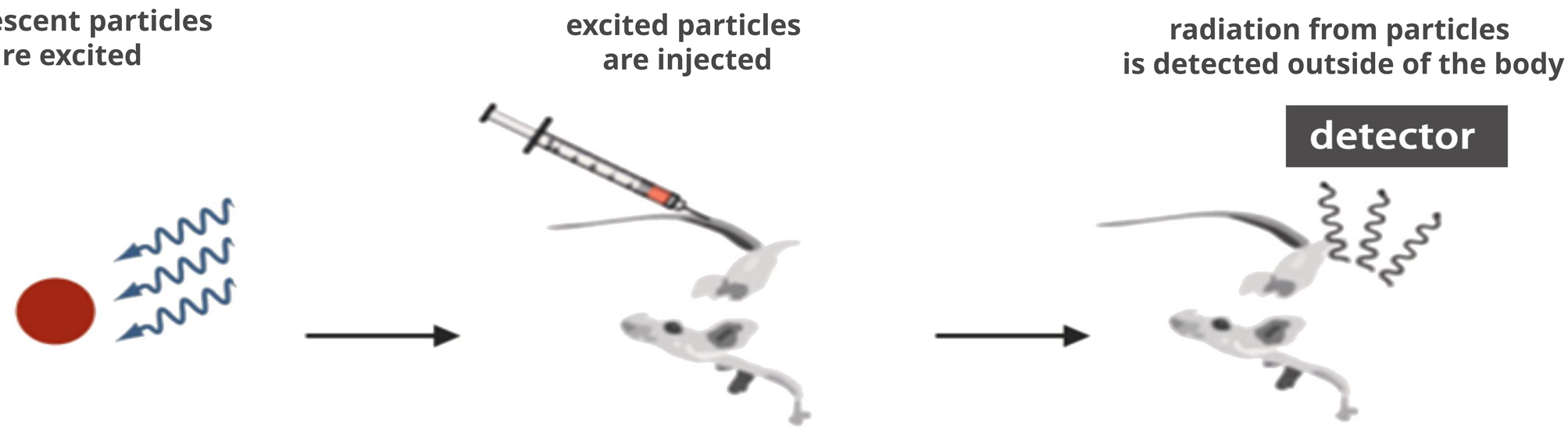
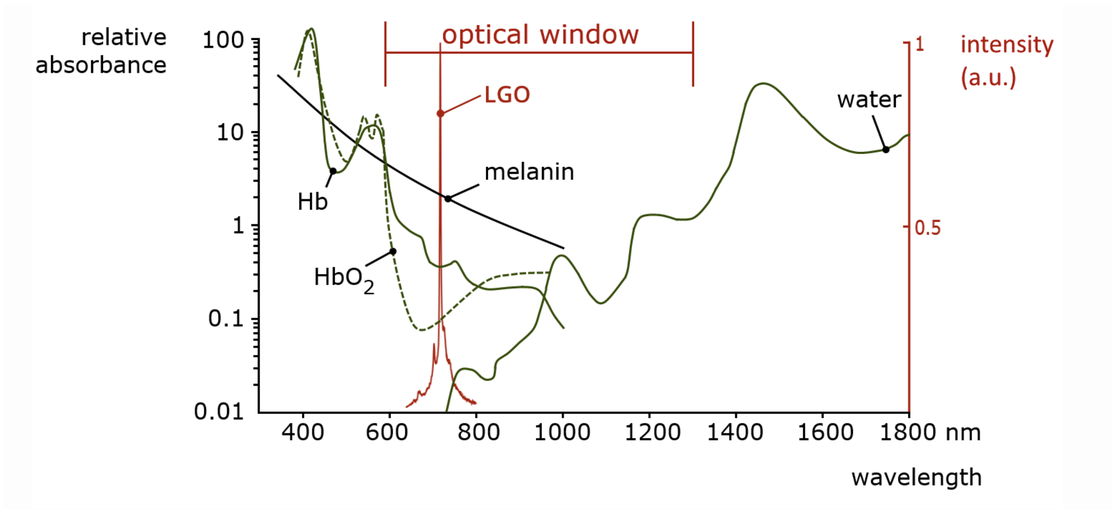
Concept



Requirements

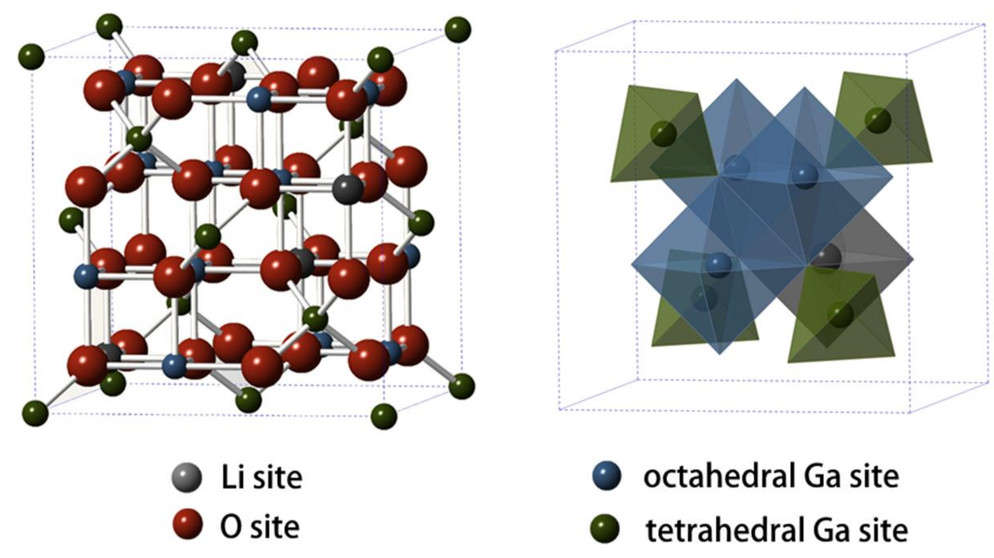
- Persistent luminescent material exhibiting afterglow in the near infrared (NIR) (optical window of human tissue)



- No cytotoxicity and/or other harmful effects of persistent luminescent nanoparticles (PNLPs)

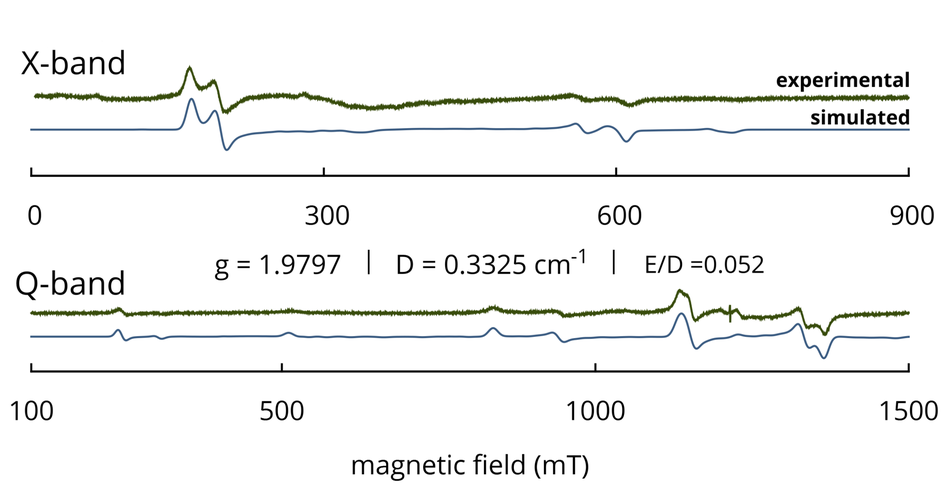
Structure of LGO

- Inverse spinel $LiGa_5O_8$ (LGO) doped with Cr^{3+} is a persistent phosphor
- The inverse structure yields intrinsic defects which cause trap states for the Cr^{3+} dopant ion
- These states can capture and store the excitation energy



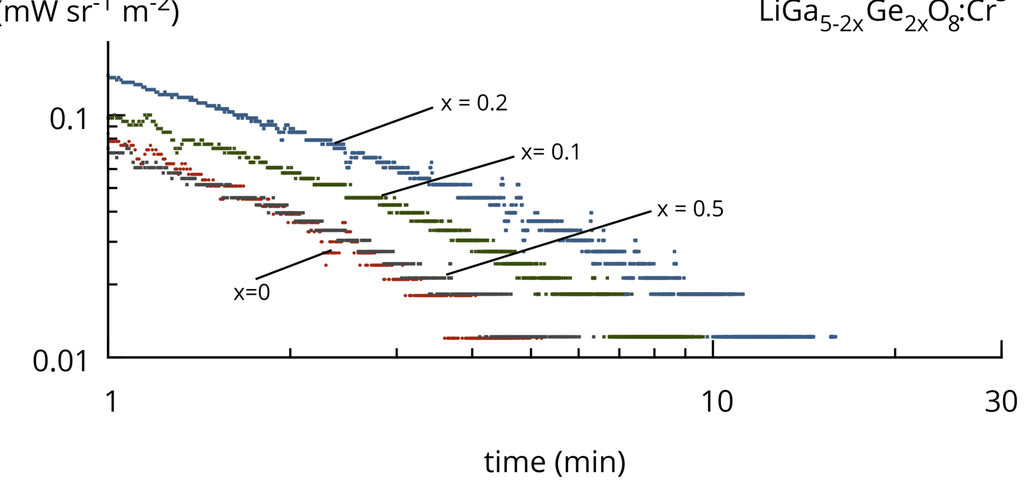
Structural properties of LGO:Cr^{3+}

- Electron paramagnetic resonance allows us to study the incorporation of dopants in the host
- The Cr^{3+} ions occupy octahedral lattice sites, distorted by the presence of nearby antisite defects
- Antisites induce local electric fields that cause electron-hole separation from excited chromium ions



Optical properties of LGO:Cr^{3+}

- LGO shows an afterglow peaking at 720 nm
- Adding Ge^{4+} (substituting for Ga^{3+} on octahedral sites) increases the afterglow time



Conclusions and perspectives

- $LGO:Cr^{3+}$ is a promising candidate for in vivo imaging applications
- Increasing the afterglow time and intensity will enhance the applicability in medical environments

Acknowledgements

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