

Plasmon enhanced few photon emission from Er³⁺-ions

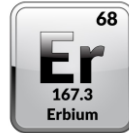
N.A. Gsken¹, M. Zapf², P. Dichtl, M.P. Nielsen¹, R. Rder², C. Ronning², R. F. Oulton¹, S.A. Maier^{1,3}
¹Imperial College London, ²Friedrich-Schiller-University Jena, ³LMU Munich

1) Background:

- Er³⁺-ions are used for fibre amplifiers as they emit light at telecoms wavelength range of $\lambda=1500$ nm.

Obstacle: they require high ion densities or high pump powers.

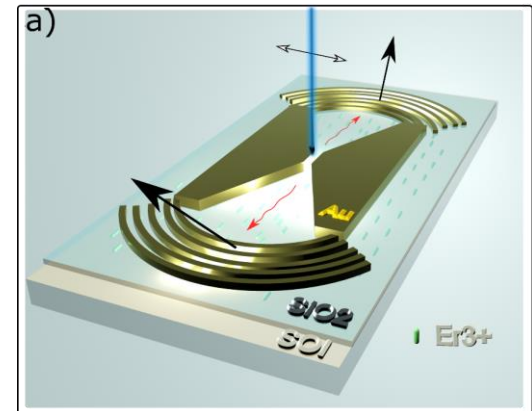
- **Approach:** Strong fields due to plasmonic field confinement enables addressing Er³⁺-ions on the nanoscale for telecoms "on-chip" emission



3) Experiment:

- Perpendicular illumination at 980 nm of a plasmonic gap waveguide

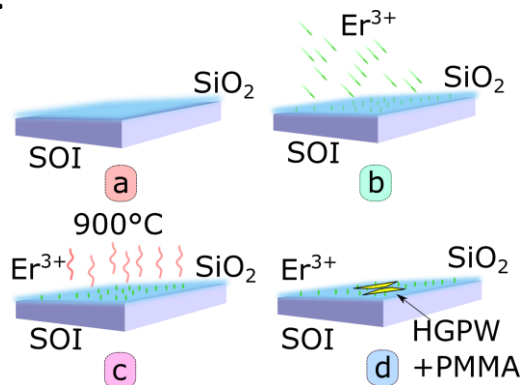
- Emission at 1536 nm via collection gratings



2) Preparation:

- 10 keV Er-ion Implantation

- Activating the ions within a SiO₂ host matrix by annealing & waveguide deposition



4) Results:

- **80x signal Enhancement via plasmonic waveguiding**

- Directional signal guiding "on-chip"

