Nitrogen-Vacancy Photoionization from the Singlet State: Micro-diamond electrodes

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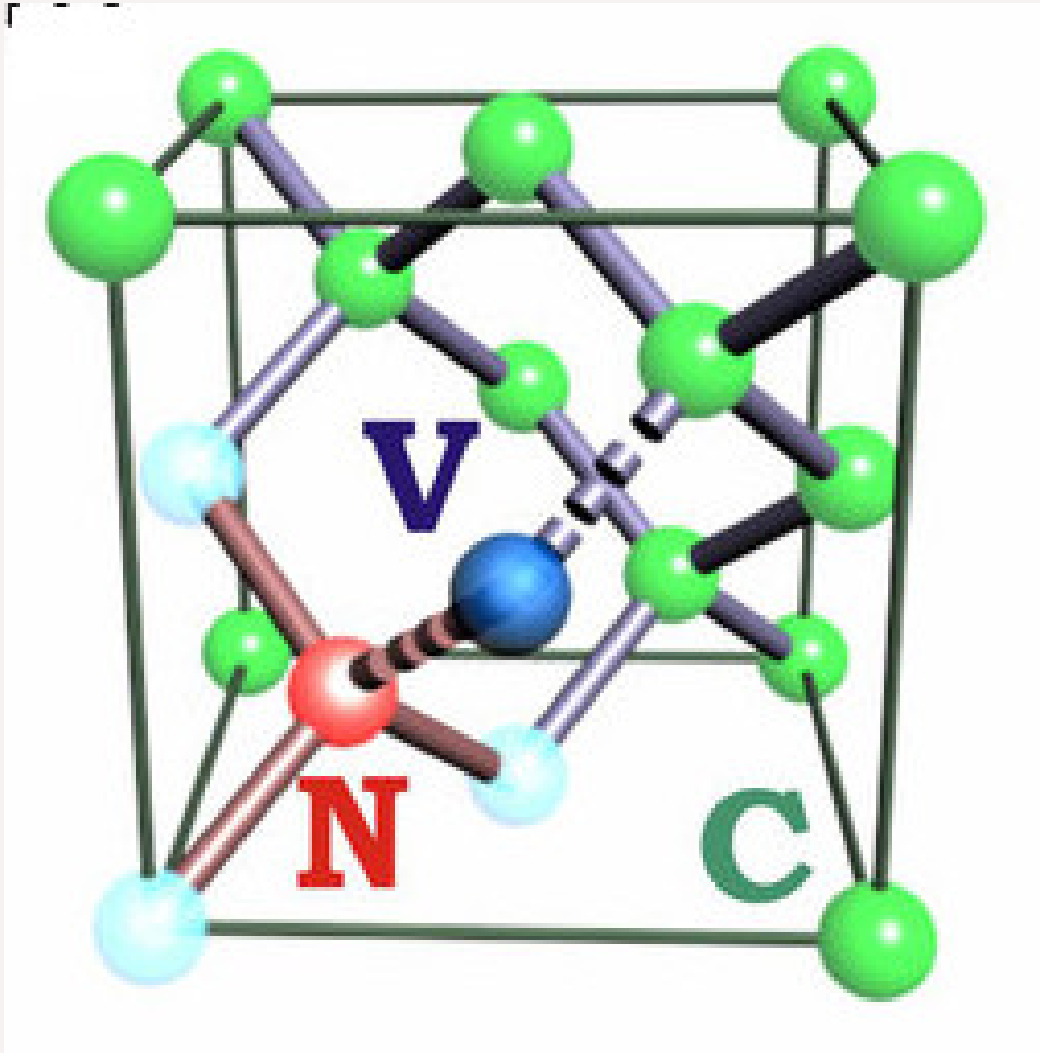
Why Nitrogen-Vacancy Diamonds

Nitro

Nitrogen-Vacancy Diamonds

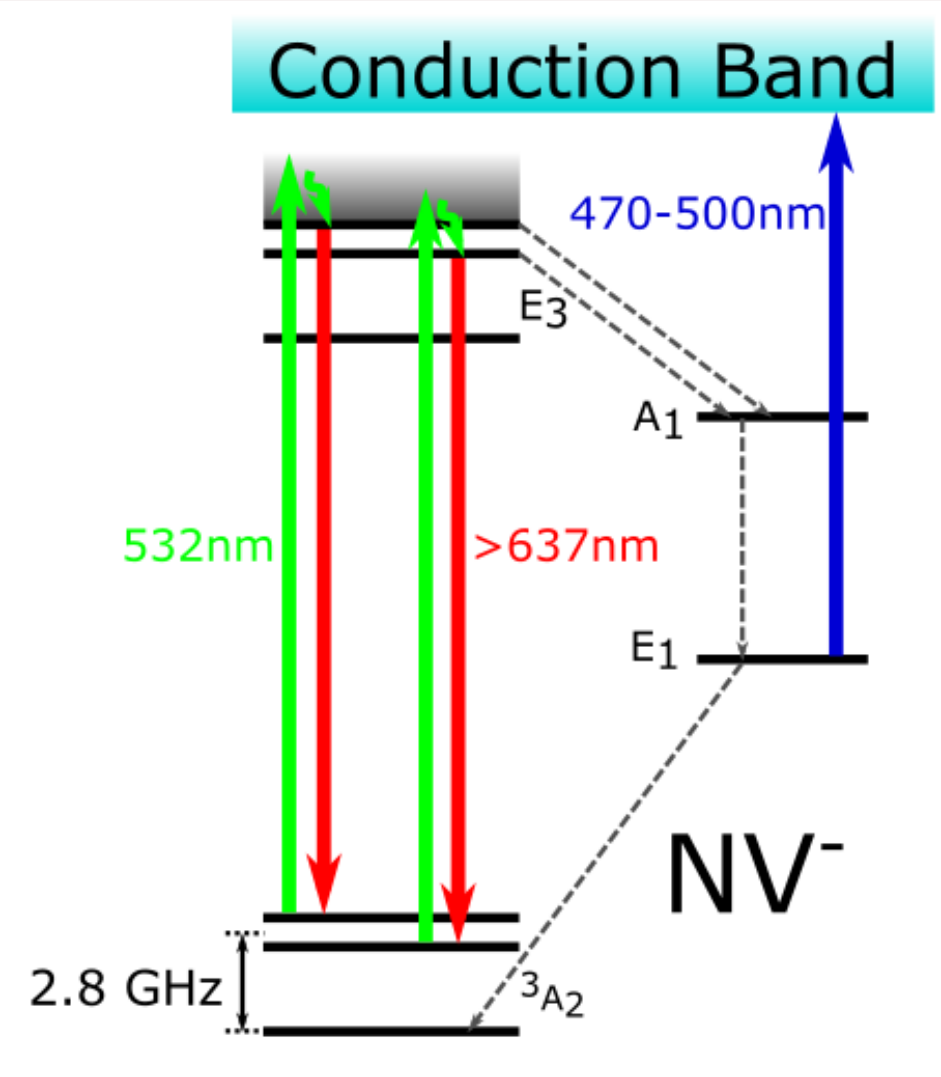
NV Defect



I. V. Fedotov, et al. Sci. Rep. 4, 5362 (2014).

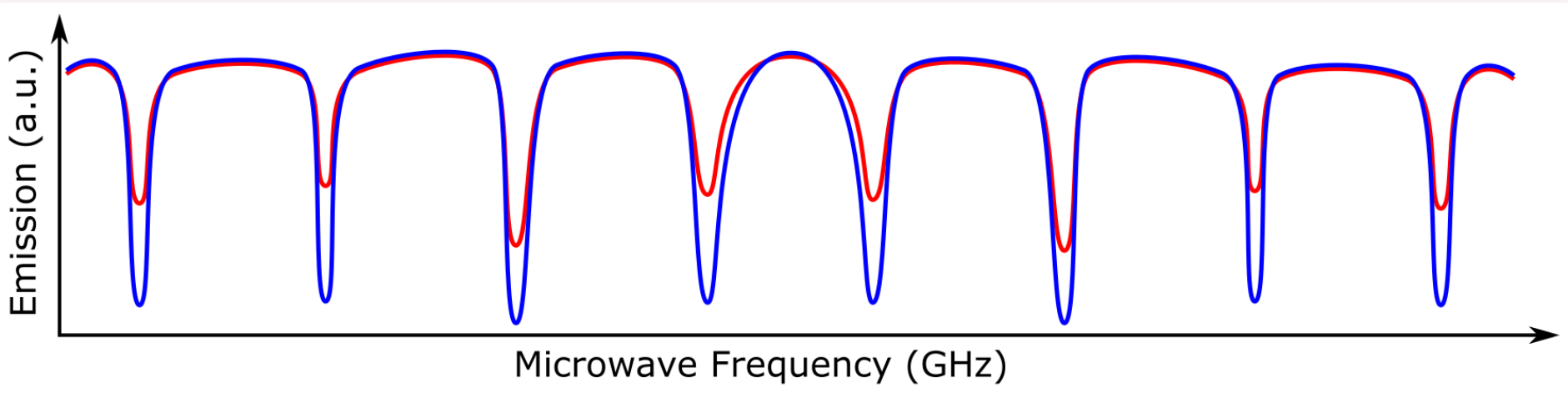
Nitrogen-Vacancy Photoionization

NV Energy and Fluorescence



Enhanced Contrast ODMR Spectrum

Optically Detected Magnetic Resonance

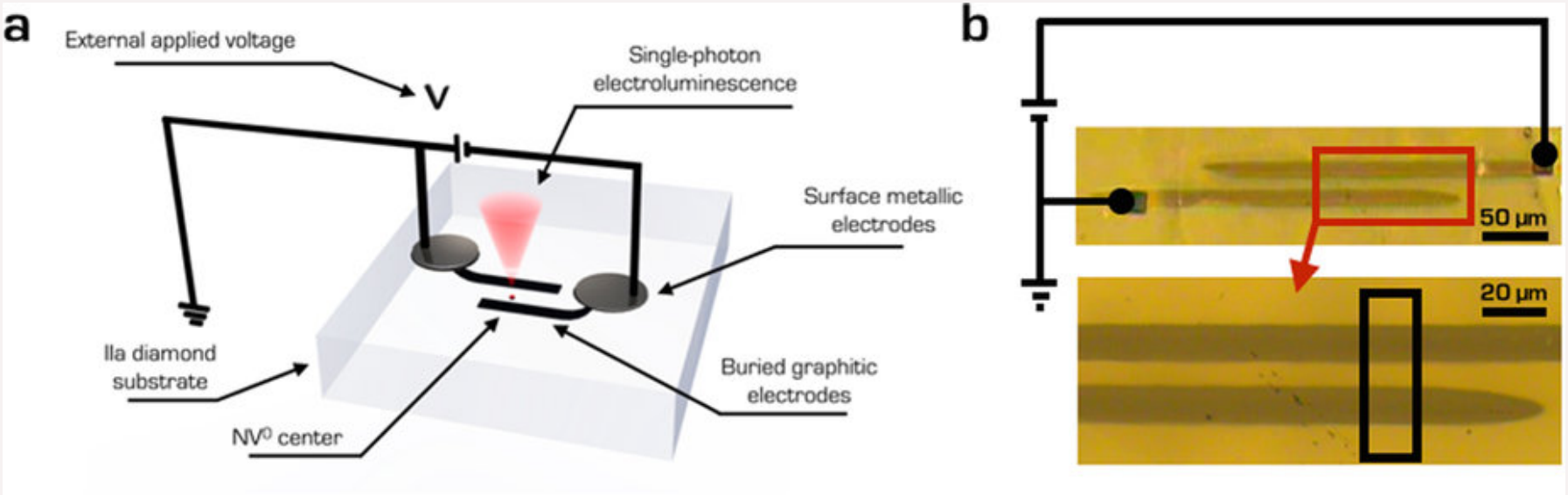


By increasing resonant peak contrast we:

- Improve signal to noise
- Increase sensitivity of magnetic field or temperature measurements

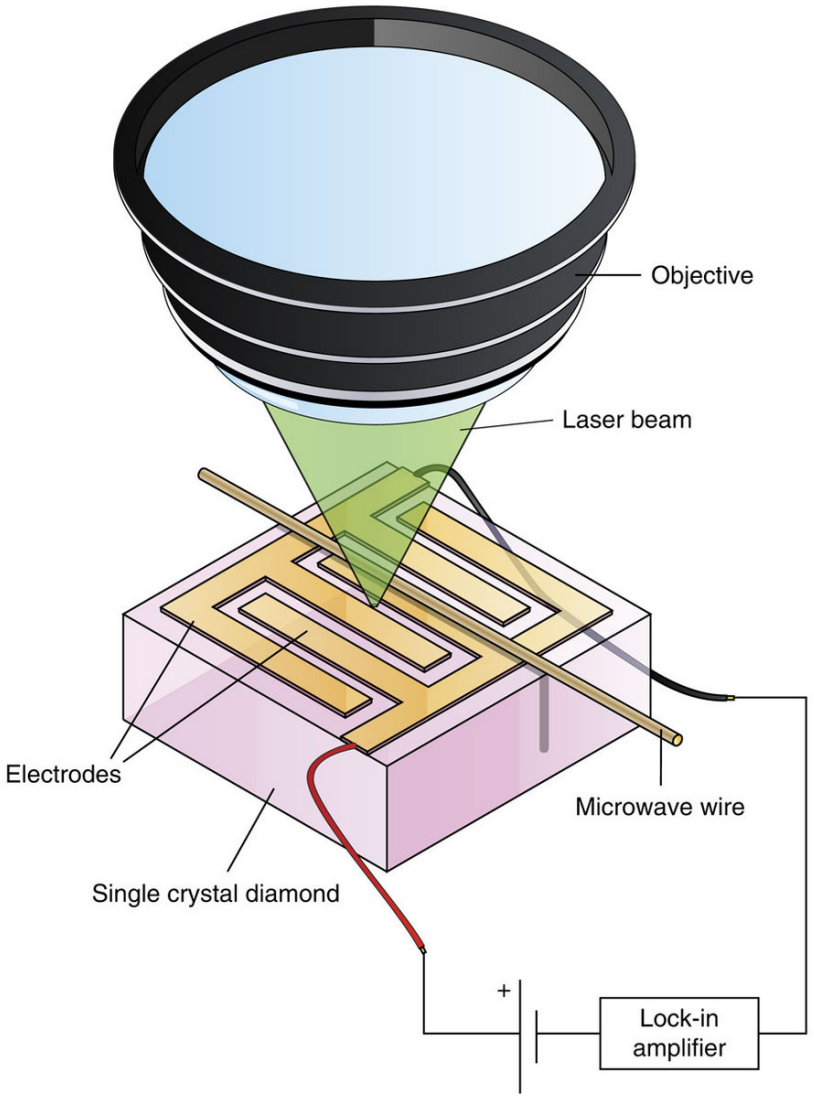
Single-Photon Electroluminescence

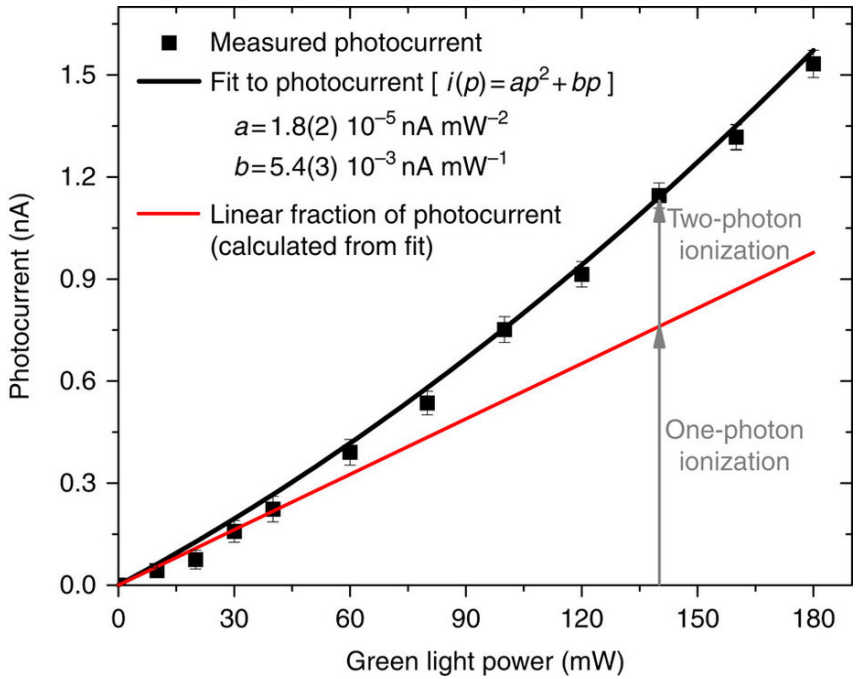
Ion-Microbeam Buried Electrodes



J. Forneris, et al. Nat. Publ. Gr. 1 (2015).

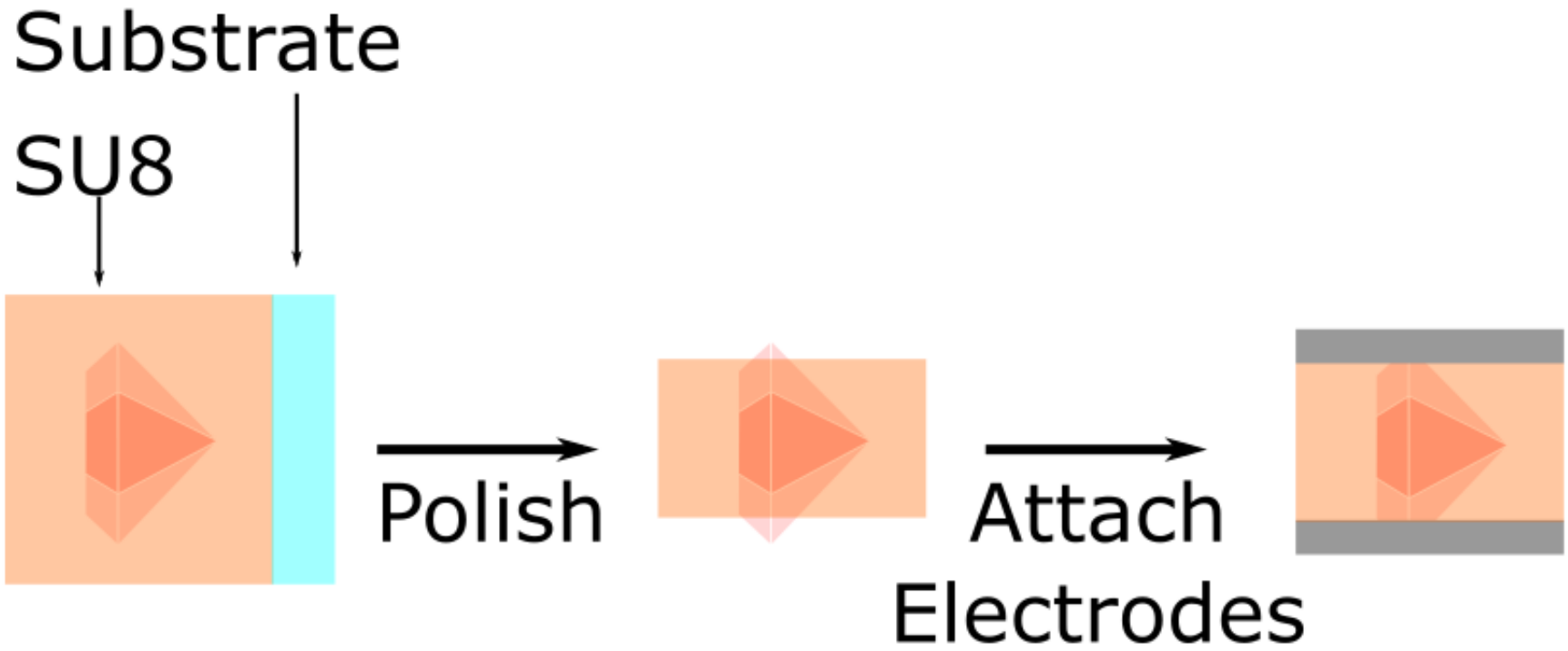
Two Photon Photoionization





E. Bourgeois, et al. Nat. Commun. 6, 8577 (2015).

Proposed Micro-diamond Electrode Process

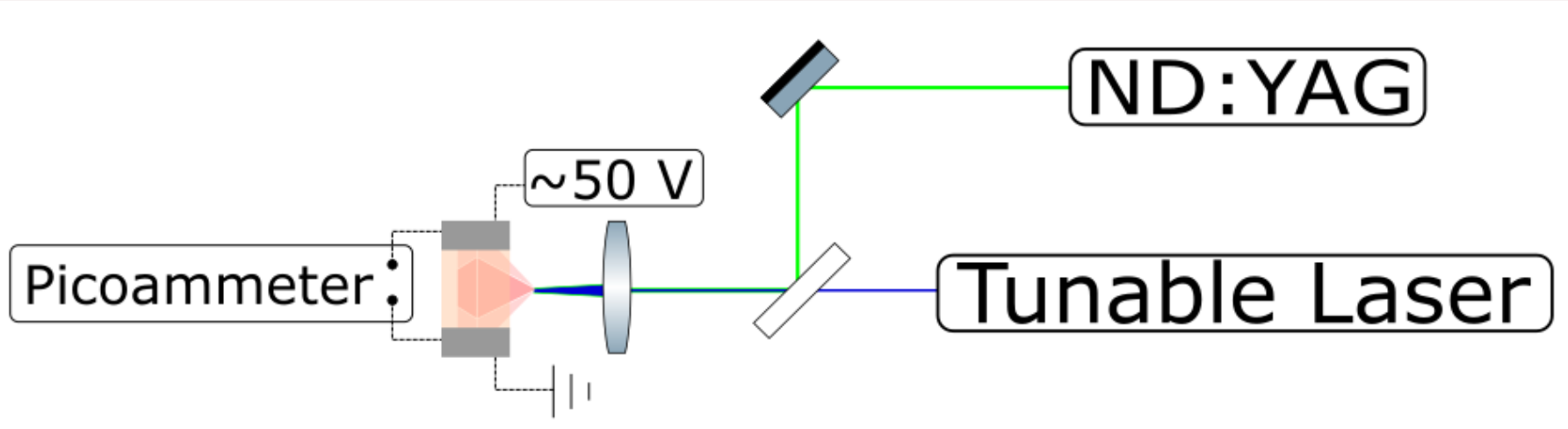


Current Progress

Currently we have successfully

Photoionization Current Measurement

Experimental Schematic



We intend to measure the photocurrent caused by photoionization in three wavelength regimes.

1. At 532 nm to verify a measured photocurrent (two-photon)
2. In the range of 470 to 500 nm (single-photon)
3. Then in the enhanced contrast ODMR regime with both green and blue light

Conclusions

- Singlet state ionization is a single photon process.
- If we can ionize from the singlet state we should be able to measure a photocurrent with a linear dependence on pump power.