Mid-infrared photothermal microscopy

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Mid-infrared (IR) spectroscopic imaging using inherent vibrational contrast has been broadly used as a powerful analytical tool for sample identification and characterization. However, the low spatial resolution and large water absorption associated with the long IR wavelengths hinder its applications to study subcellular features in living systems. Recently developed mid-infrared photothermal (MIP) microscopy overcomes these limitations by probing the IR absorption–induced photothermal effect using a visible light [1-6]. MIP microscopy yields sub-micrometer spatial resolution with high spectral fidelity and reduced water background. In this presentation, we overview different mid-infrared photothermal contrast mechanisms and discuss instrumentations for scanning and widefield MIP microscope configurations. We highlight a broad range of applications from life science to materials. We further provide future perspective and potential avenues.

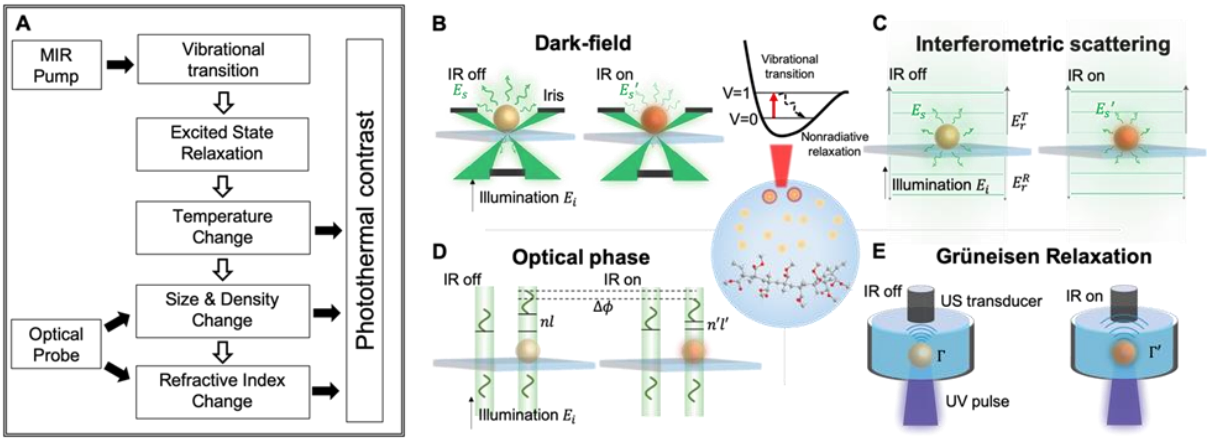

Fig. 1. principle and contract mechanism of mid-infrared photothermal microscopy, adapted from Science Advances, 2021, 7: eabg1559.

References

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