

# Gap-enhanced Raman endoscopy for early cancer detection

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The white-light endoscope is a conventional imaging tool for cancer screening but with limited detection accuracy particularly in early cancer diagnosis. This project aims to develop a molecular-sensitive Raman endoscopy system using a kind of novel Raman nanoprobes, termed gap-enhanced Raman tags (GERTs) as one of the novel functional modalities. The GERT endoscopy proposed to develop has a number of advantages including the ultra-narrow linewidth of the fingerprint spectrum for multiplex imaging, low autofluorescence and photobleaching, a strong Raman enhancement factor beyond  $10^9$ , and a detection sensitivity down to a single-nanoparticle level. The GERT endoscopy can provide with multiple molecular characteristics for identifying early lesions in vivo at the molecular level during endoscopic examination.

