

3. Summary

In summary, we have demonstrated non-scanning chemically selective 3D bio-imaging via holographic CARS microscopy. In addition to reconstructing the intensity distribution at different depth positions CARS holography also captures the phase information, which is not available in the wide-field imaging modality, and can lead to tomographic reconstruction through advanced digital processing algorithm (e.g., compressive holography [14]). Our imaging results on live HeLa cells indicate that CARS holography is useful as a practical tool for 3D cellular imaging. The unique ability of label-free and thus non-toxic imaging allows for long duration studies of sub-cellular components in live specimens. Furthermore, with the added capability of single-shot imaging, CARS holography has the potential to image fast biological processes at laser pulse duration limited speed.

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