























Fig. 7. One dimensional grating images at  $-1.25\mu\text{m}$  defocus using different pinhole radii.

## 5. Conclusion

This paper has demonstrated the feasibility of using a confocal arrangement to perform localized measurement of SP propagation. We have examined the effect of pinhole diameter and also shown the effects of different illumination pupil functions. The method offers an alternative to interferometric SP imaging which is simpler and more stable, and perhaps the most significant advantage is that it can be incorporated into a conventional confocal microscope with minimal adaptation. The use of alternative input polarization states will provide a useful extension of the technique. It will be interesting to apply the technique proposed here on structured plasmonic surfaces [9] which are expected to give improvements in sensitivity to local variations in refractive index.

## Acknowledgments

The authors gratefully acknowledge the financial support of the Engineering and Physical Sciences Research Council (EPSRC) for a platform grant, 'Strategies for Biological Imaging', and also the UK and China Scholarship Council (CSC) for Bei Zhang's Scholarship. We thank Dr. Han-min Tan for sample fabrication and BZ thanks Dr. Mark Pitter for guidance in optical imaging techniques.