Reflectarray antenna research in TL@NUS & DSO– Part I

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A review of the research efforts in TL@NUS on reflectarray antenna since 2013 will be given. Several examples of reflectarray antennas will be shown to illustrate the different types and functions, such as those with high efficiency, or folded for reduced profile, and others that are capable of beam-scanning, dual-band dual-polarization operation, and many others.

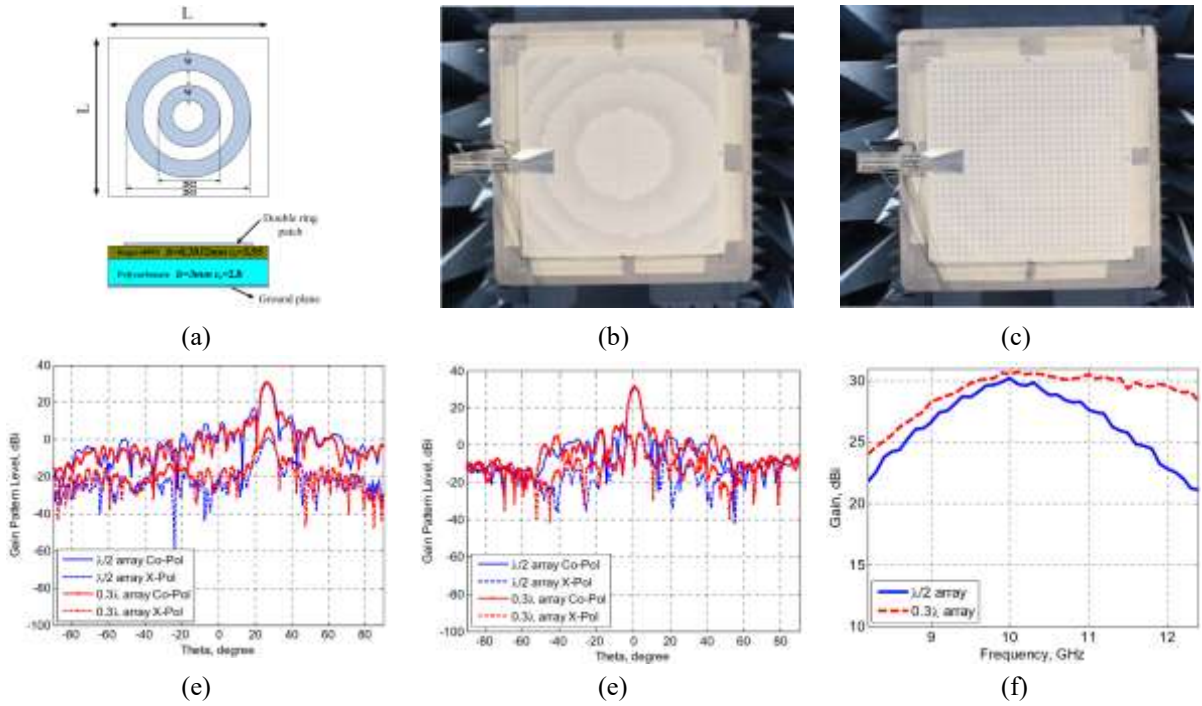

Figure 1: High-efficiency reflectarray antenna. (a) double-ring element. (b) 2025-0.3λ-element prototype. (c) 729-0.5λ-element prototype. Comparison of the two designs: measured gain pattern in (d) x-z plane and (e) plane forming 25° with y-z plane, (f) measured gain-bandwidth [1]

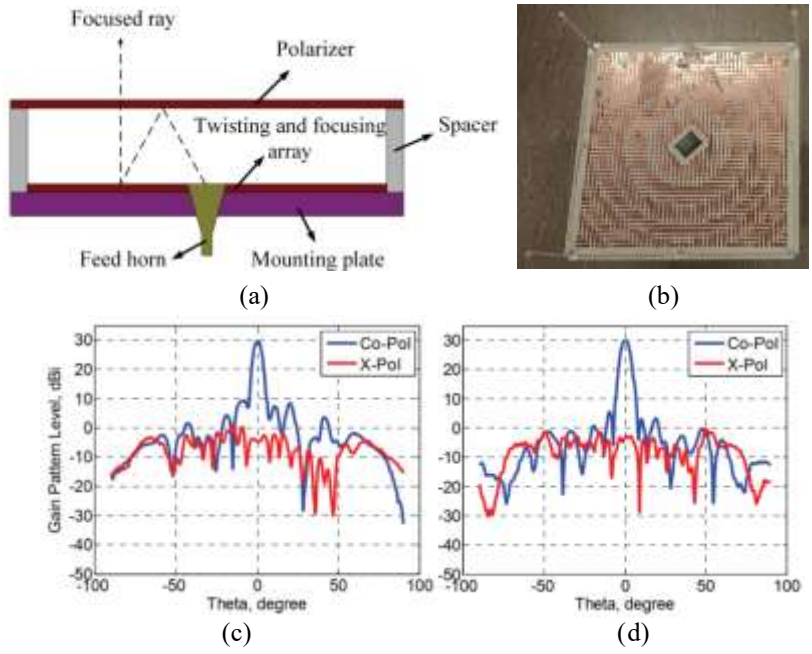

Figure 2: Folded reflectarray antenna. (a) Schematic. (b) 405 × 405 mm^2 prototype. Measured pattern in (c) x-x plane. (d) y-y plane. [3]

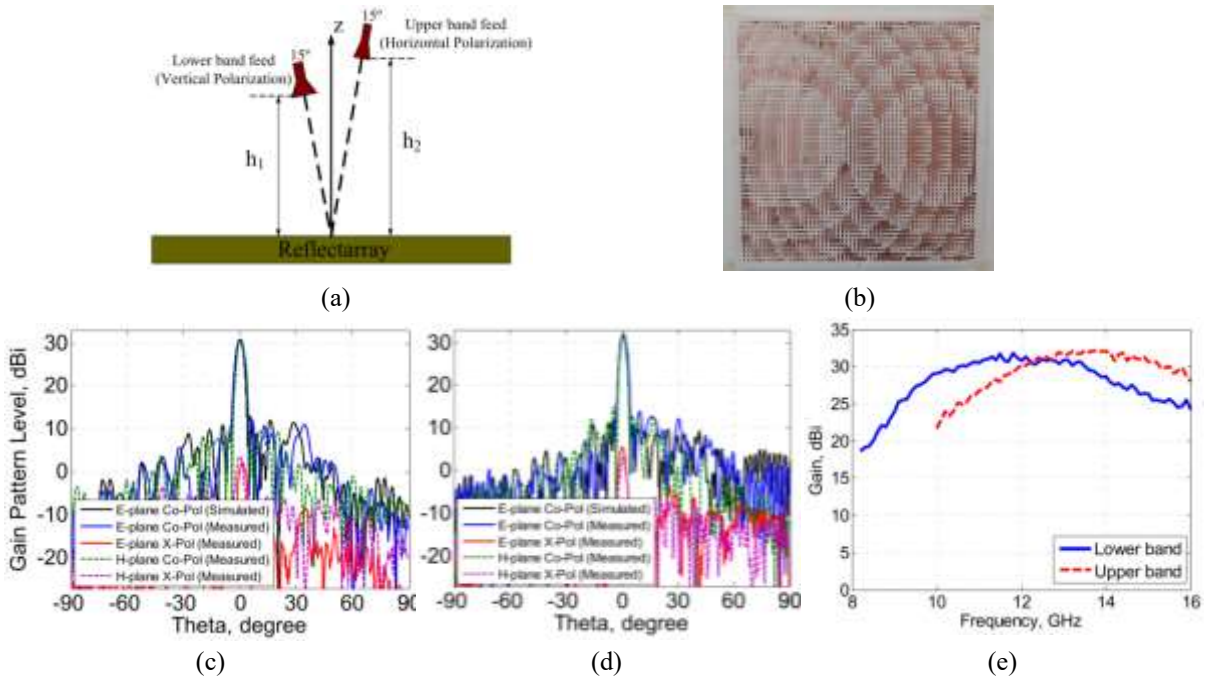

Figure 3: Dual-band dual-polarized reflectarray antenna. (a) Schematic. (b) Prototype. (c) lower band gain patterns at 11.7 GHz. (d) upper band gain patterns at 13.7 GHz. (e) measured gain-bandwidth [2]

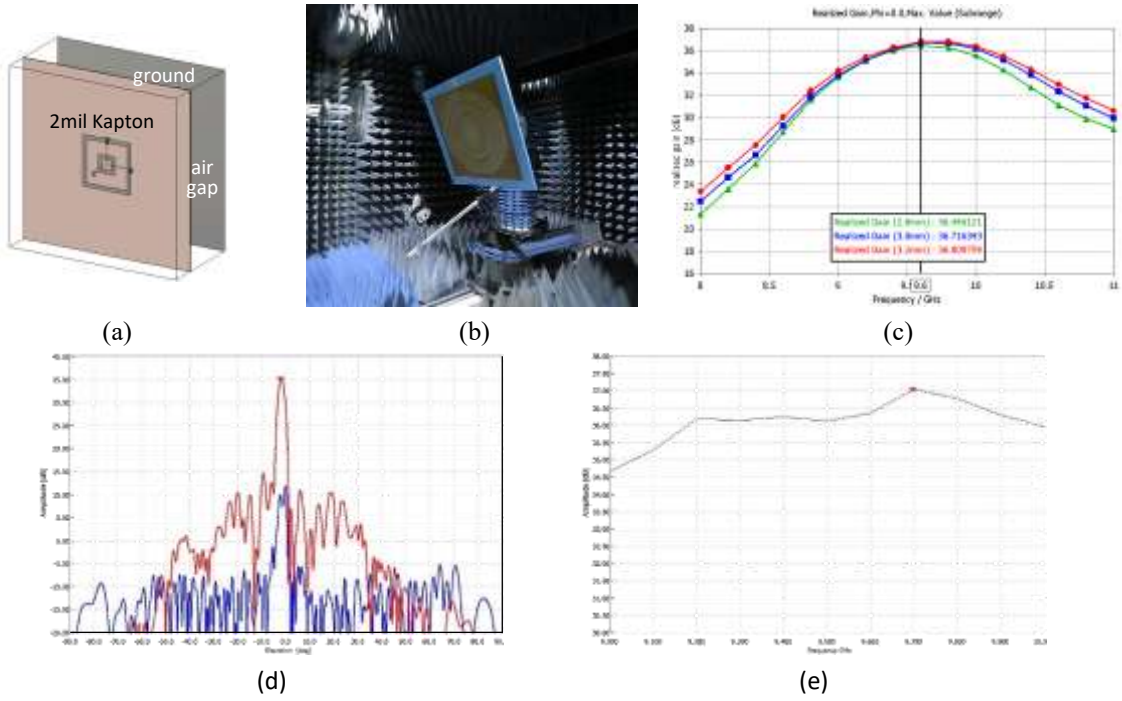

Figure 4: Large deployable reflectarray antenna. (a) unit element. (b) prototype in anechoic chamber. (c) effect of air gap. (d) measured gain pattern. (e) gain-bandwidth. [4]

References

[1] L. Guo, P. Tan and T. Chio, "Reflectarray Antennas," *TL@NUS D4 Tech. Rev. Rep.*, 2014.

[2] L. Guo, P.-K. Tan and T.-H. Chio, "Single-Layered Broadband Dual-Band Reflectarray With Linear Orthogonal Polarizations," *IEEE Trans. Antennas Propag.*, vo. 64, Sep. 2016, pp. 4064-4068.

[3] L. Guo, P. Tan and T. Chio, "On the Use of Single-Layered Subwavelength Rectangular Patch Elements for Broadband Folded Reflectarrays," *IEEE Antennas Wireless Propag. Lett.,* vol. 16, 2017, pp. 424-427.

[4] Chia Tse Tong, et al., IDP, 2019