

DEVELOPMENT OF DUAL AXIS MICROTRACKING SYSTEM FOR CONCENTRATOR PHOTOVOLTAIC

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Concentrator photovoltaic (CPV) is a photovoltaic technology to realize the highest conversion efficiency from direct sunlight to electricity. A high concentration CPV module can achieve 36% efficiency for direct solar radiation¹. CPV needs a solar tracking system to keep facing to the sun. The problem seems to lie in the fact that the conventional solar tracking system is large and heavy; tracker cost and construction cost tend to be high; and it is difficult to make a dense array. In order to solve these problems, compact microtracking systems, in which tracking mechanism is integrated into the CPV module have been recently studied². To realise such a microtracking system, light weight and low-cost mechanism design to synchronously drive numerous micro CPV lens-cell units. In this paper, we introduce a practical microtracking system with a unique tracking mechanism. Low height and light weight feature of the present system enables easy transportation, mounting, and low-cost construction. The present system can be mounted on a horizontal or a tilted fixed plane in the same way as the conventional flat plate photovoltaic modules. Figure 1 shows a prototype microtracking system on which multiple CPV lens-cell units are integrated. Experimental results show that the prototype system can synchronously drive the CPV lens-cell units with tracking angle error less than 1 degree.



Figure 1: Photograph of a prototype 2-axis microtracking system for CPV

- [1] Steiner, M. *et al.* FLATCON CPV module with 36.7% efficiency equipped with four-junction solar cells. *Prog. Photovolt: Res. Appl.* **23**, 1323–1329 (2015).
- [2] Price, J. S., Sheng, X., Meulblok, B. M., Rogers, J. A. & Giebink, N. C. Wide-angle planar microtracking for quasi-static microcell concentrating photovoltaics. *Nat. Commun.* **6**, (2015).