

## **ASTRI particle receiver technology: research progress and on-sun test plan**

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Aiming for higher efficiency and lower cost CSP/T (Concentrating Solar Power/Thermal) systems for next generation solar technology, CSIRO has been working on the development of particle receiver technologies (using granular ceramic particles for heat transfer and thermal storage medium) as a part of ASTRI (Australian Solar Research Institute) research program.

Owing to its cost-effective applicability as a high-temperature heat transfer and thermal storage media with superior thermal and chemical stability, the particle technology has been identified as one of the promising pathways to the future CSP/T systems also by US DOE (Department of Energy) and other international institutions such as KSU (King Saud University) and DLR (German Aerospace centre) with extensive research supports to fill the technical gaps and to progress toward demonstrations.

During the course of past research, CSIRO has developed and proved novel particle receiver concepts employing an idea of multi-stage falling so that the stability and performance of the particle receiver are expected to be significantly improved. The research has also developed new particle heat exchanger concepts which could provide promising options for low-cost and high performance particle heat exchangers in a commercial scale.

Main research activities being undertaken and planned by ASTRI particle research project are summarised as follows:

- Design and construction of a  $>750\text{kW}_t$  multi-stage falling particle receiver ( $>800^\circ\text{C}$ ,  $\sim 90\%$  efficiency) and sub-systems required for construction of a test system including a small thermal storage system with a particle heat exchanger;
- Comprehensive modelling for both heat transfer and system performance for deployable commercial systems;
- On-sun receiver test to demonstrate and validate the receiver design, material selection and performance predictions; and
- Provision of a test receiver, designs of storage tanks/heat exchanger and test system specifications for a larger-scale integrated system demonstration.

Up-to-date progress of the research and future plan will be presented in the conference.