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Laser-based production tools increase solar cell efficiencies

Cher Client,

The new Aethon™ and Coherent Equinox™ turn-key laser-based process meet the requirements from next-generation silicon solar cell production. These tools feature advanced wafer handling capabilities and include Coherent laser sources already used in production within the industry.

Solar cell production is split into two types of solar panels. Those comprised of silicon cells and those based upon thin-film panels. Traditionally lasers have been used extensively for thin-film patterning, with applications for laser-based tools in c-Si restricted mainly to a routine process known as edge isolation. Due to changes in the market supply-demand dynamics, the equipment supply-chain for silicon solar cells is adjusting to requests for increased cell efficiencies. This calls for new solar cell concepts. These cell types are often call advanced concepts, and have different process steps to the standard silicon cells. Almost all the new cell types use laser-based process steps at key enabling stages. The Aethon and Coherent Equinox laser-based process tools have been designed to meet this new demand.

The Aethon is configured with process qualification in mind, and includes a host of development features; x-y-z motion stages to enable precise positioning of the wafer; a fast x-y galvanometer-mounted scanning system with a wide process area; vision diagnostics to locate precisely the position of the beam; and software to reposition wafers with micron-level accuracy. The Aethon can include up to 3 different lasers from the Coherent AVIA™, Talisker™, and Paladin™ product ranges. The Aethon is ideal for exploring all variables related to laser-based solar cell

processing, prior to fixing production-ready parameters. Tools can be upgraded with extra lasers, wavelengths, or beam-delivery options; and handling can be added to enable low-volume runs.

There are two versions of the Coherent Equinox. The Equinox-Pilot is designed for pilot-line production with a two-station dual-wafer turntable. Similar to the Aethon, the Equinox series can be equipped with up to 3 Coherent DPSS lasers. The Equinox-Pilot features a fast galvanometer-based scanner with process speeds greater than 7m/s. This tool version can be paired with robotic load/unload handling automation for throughputs in excess of 1000 wafers per hour (wph). The Equinox-Fab is designed for high-throughput operation with solar fabs, and has two handling options. The Equinox-Fab-TT includes a multi-station turntable in which up to four wafers can be processed simultaneously. Options here include multiple beams and scanner arrangements to best suit the application and throughput demands. The Equinox-Fab-CB allows multiple wafers to be processed simultaneously via inline horizontal conveyor belts. The Equinox-Fab tools can operate with throughputs in excess of 3,600 wph.

Each tool can be optimized for the various laser-based applications enabled by the Coherent AVIA, Talisker, and Paladin lasers. These applications can be divided into loss preventative process steps (like edge and contact isolation) and efficiency enhancement steps (such as selective emitter formation including dopant diffusion, back-contact wrap-through cells, back-junction structuring and dielectric laser or stack patterning). Key benefits provided by the AVIA, Talisker, and Paladin lasers include short-wavelength operation in the ultra-violet (355 nm), high-power operation up to 45 W, and short pulse-width options down to picosecond durations.

For more information, please contact Solar@Coherent.com
or visit our solar website at www.Coherent.com/Solar

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About Coherent, Inc.

Founded in 1966, Coherent, Inc. is a world leader in providing laser-based solutions to the commercial and scientific research markets.

To find out more about Coherent, visit our website at http://www.coherent.fr/
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