

## PulseForge® 3300

### **Manufacturing Development and Production** *Semiconductor and Photovoltaic Materials*



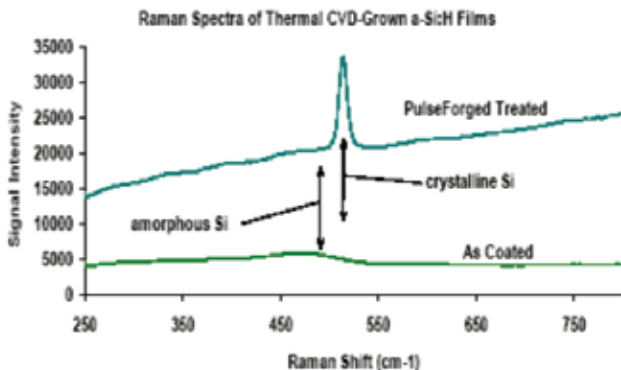
PulseForge 3300 depicted in 150mm process width integrated with conveyor material handling system

### **Overview**

NovaCentrix launched the PulseForge 3300 to address the need for processing printed Si inks, both for printed logic as well as for photovoltaic applications, on low-temperature substrates. In keeping with the modular architecture established for the PulseForge 3100, the PulseForge 3300 is designed for roll-to-roll and conveyor-based materials processing. The PulseForge 3300 is optimal for application development as well as full-volume production.

## Designed for Printed Electronics: Semiconductors and Photovoltaics

The PulseForge 3300 is designed to process the materials, such as silicon, zinc oxide, and CIGS, used for printed logic, display, and photovoltaic applications. The tools create the very high processing temperatures required for recrystallization and annealing, but without damaging low-temperature materials like polymeric substrates or adjacent organic materials. This is accomplished by using proprietary high-intensity lamps at very short pulse durations.



Data indicating crystallization of 200nm a-Si thin-film on borosilicate glass with PulseForge 3300.

## Power Delivery

The PulseForge 3300 commercial processing tool is capable of delivering a maximum peak power to the target materials in excess of 100 kW/cm<sup>2</sup>. Sustained peak operating delivery of 5 megawatts (5 MW) during pulse can readily be obtained with 15cm width processing. This type of power delivery is required to achieve the very-high surface heating of the target semiconductor materials, without damaging the underlying low-temperature substrates such as plastic film.

## Pulse Length

Microseconds of over-exposure can be the difference between a successful process condition and a failed product. That's why the PulseForge 3300 is designed to deliver exposures as short as 30 microseconds. This range of process duration is too short for mechanical

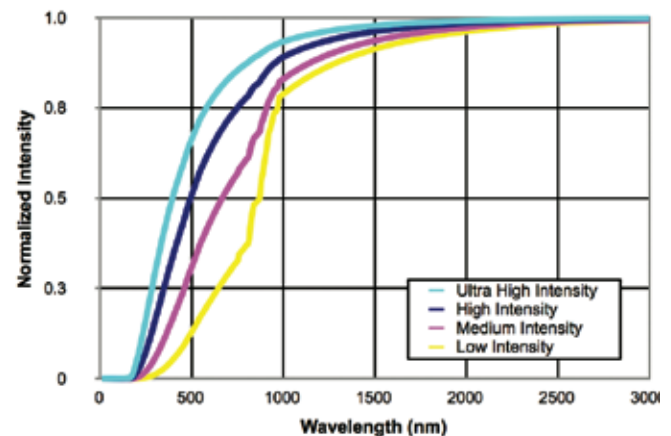
shuttering, so the PulseForge 3300 accomplishes this by exact control of the voltage and current delivered to the proprietary lamps.

## Pulse Rate

As a primary consideration, the pulse rate directly determines the amount of material that can be processed, or the line speed when used in roll-to-roll processing. The higher the pulse repetition rate, the more material can be processed. The PulseForge 3300 has a max pulse rate of >1kHz. This enables production speeds far faster than most current applications require.

## Pulse Spectrum

The emitted spectrum is generally broad, from UV to near IR, or from 200 nm to 1000nm. The pulse conditions can be changed, however, to shift the spectral characteristics of the emission to favor red or blue even without the use of additional filtration. As a result, the PulseForge 3300 can deliver as much as 50% of the pulse energy at or below 400 nm, or as little as 5%. The tool can therefore effectively process materials requiring UV energy, and can process materials damaged by UV energy.



## Samples Processing

Contact NovaCentrix to arrange to have your materials processed by a PulseForge 3300, or other PulseForge tools, at our facility.

## Contact us today to learn more:

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