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Laser 3D Manufacturing V

Henry Helvajian
Bo Gu
Alberto Piqué
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Introduction

The fifth meeting of *Laser 3D Manufacturing* at Photonics West 2018 comprised thirteen sessions distributed over four full days of presentations. A joint session with the *Advanced Fabrication Technologies for Micro/Nano Optics and Photonics XI Conference* provided a technical interchange forum between a community that is fabricating structures with novel materials and a community developing 3D manufacturing processes. The *Laser 3D Manufacturing* conference also held a special session on laser peening/cladding; a commercially established process which could be incorporated into a laser metal additive process for improving surface finish and material strength/fatigue properties. Also added to the event was a Panel Discussion "3D Printing and Industry 4.0: An Industry Perspective" sponsored by SPIE's Industry Development Group that had nearly 200 in attendance over a 90-minute segment.

Presentations at the conference included laser 3D fabrication in polymers, glass, metals and composites. Improvements in the processing technology are apparent even over the five years that this meeting has been held, with presentations on qualification and reliability showing data that the industry is coming to grips with the issue by way of process control technology and sensors. However, there are still outstanding issues and some were highlighted at the Industry Panel Discussion:

1) In 3D manufacturing, how can you keep the intellectual property (IP) safe when 3D digital CAD files are transferred across machines and possibly over continents?

2) How can you keep your processing machine from being "hacked" when the tool operates via digital files?

Both are matters of security that must be addressed for 3D manufacturing to become ubiquitous in the production world. While Photonics West is not the forum for digital security, the Laser 3D conference chairs have taken the action item to host a special session on security at the 2019 meeting.

Laser 3D manufacturing appears to be gaining acceptance by an industry that has its sights set not only in the production of simple commodities but also for very high value items such as that used in the aerospace industry. We see the future in the development of new materials for additive manufacturing and in the design and demonstration of 3D structures that have complex properties (e.g. folding).

But first, the community needs to establish process control so repeatability and reliability become "second nature."

Finally, the conference organizers wish to thank, the PolarOnyx Corporation of San Jose, California (United States) for their sponsorship which allowed the support of students.

Henry Halvajian
Bo Gu
Alberto Piqué