



## AEROSOL JET PRINTED QUANTUM DOT MATRIX

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Inventors: Joseph Andrews, Anna Meredith

### Overview

Quantum dots are nanometer-sized semiconductors with optical properties that result from a combination of their small size and quantum mechanical effects. In one important application, quantum dots may operate as down-converters, excited by a first higher frequency of light into photoluminescence to emit a second lower frequency narrowband light. This feature of quantum dots may be used, for example, in producing a color television type display in which individual blue LEDs associated with display subpixels (red, green, or blue) are overlaid with quantum dots down converting the blue light into red, green, or blue light respectively. This feature of quantum dots may also be useful in producing color image sensors in which the quantum dots provide a narrowband filtering of light received by broadband photo detecting elements such as photodiodes, CMOS detectors, or CCD detectors.

### The Invention

UW-Madison researchers have determined that by extracting the solvent necessary to provide an aerosolizable quantum dot ink, during the time that the droplets are in-flight, assemblies of quantum dots may be printed having a substantially uniform height without a constraining photolithographic mask. Eliminating this mask greatly simplifies manufacture, reduces material waste, and allows the thickness and profile of the quantum dot matrix to be varied on a matrix by matrix basis to maximize the light output of different quantum dots associated with different colors. The process eliminates or greatly reduces the need for a binder, improving the printing density, conversion efficiency, and further lowering material costs.

### Additional Information

#### For More Information About the Inventors

- [Joseph Andrews](#)

#### Tech Fields

- [Engineering : Additive manufacturing](#)

For current licensing status, please contact Michael Carey at [mcarey@warf.org](mailto:mcarey@warf.org) or 608-960-9867