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(54) **Title:** SYSTEMS AND METHODS FOR DRILLING VIAS IN TRANSPARENT MATERIALS

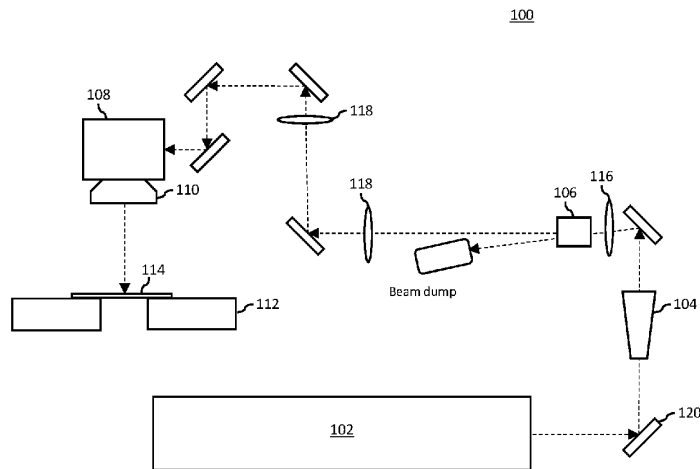


FIG. 1

(57) **Abstract:** A method for forming a through- via in a substrate having opposing first and second surfaces can include directing a focused beam of laser pulses into the substrate through the first surface of the substrate and, subsequently, through the second surface of the substrate. The focused beam of laser pulses can have a wavelength to which the substrate is at least substantially transparent and a beam waist of the focused beam of laser pulses is closer to the second surface than to the first surface. The focused beam of laser pulses is characterized by a pulse repetition rate, a peak optical intensity at the substrate and an average power at the substrate sufficient to: melt a region of the substrate near the second surface, thereby creating a melt zone within the substrate; propagate the melt zone toward the first surface; and vaporize or boil material of the substrate and located within the melt zone.

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