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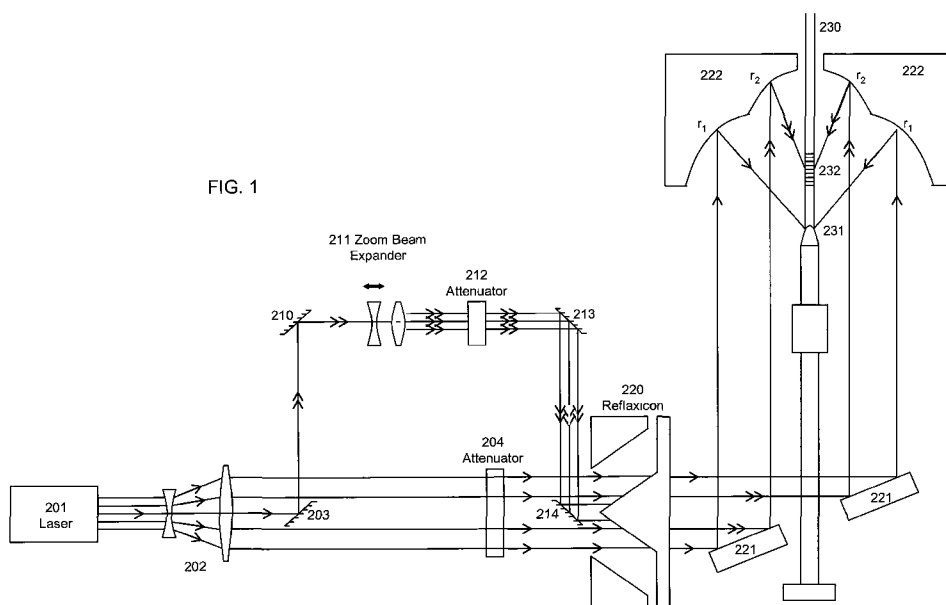
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(54) Title: MULTI-BEAM OPTICAL AFTERHEATER FOR LASER HEATED PEDSTAL GROWTH



(57) Abstract: A post-growth optical afterheater system includes an appropriate choice of optical heat source for the single crystal material to be heated, a power adjustment module for controlling the optical power heating the crystal, and suitable focusing optics to focus the heating beam onto the crystal. The heat source may be a laser of appropriate wavelength or an incoherent source of sufficient power. In one embodiment, the power adjustment module is an optical attenuator, either of crossed-polarizer design or of intersecting wire grids. The focusing optics may be refractive, reflective, or catadioptric, depending on factors such as diameter, cost target, and space available in the crystal growth apparatus.

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USPC - 117/33

According to International Patent Classification (IPC) or to both national classification and IPC

B FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC - 117/33, 117/34, 117/904, 117/950

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST - PGPB,USPT,USOC,EPAB,JPAB, Dialog Classic Files 7 654, 652, 351, 349, 315, 2, 6, 35, 65, Google Scholar, Google Patents, USPTO Web Page, Search terms - laser, beam, LHPG, afterheater, crystal rod, lithium niobate, molten zone, elliptical mirror, reflective axicon, bifocal mirror, annular beam, attenuator, housing

C DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	US 2005/0259940 A1 (KUO et al) 24 November 2005 (24 11 2005) para [0015], [0026], [0028]-[0035], Fig 1, 3, 4	1-21
Y	US 5,705,788 A (BEYER et al) 06 January 1998 (06 01 1998) col 1, ln 13-17, col 5, ln 20-25	1-21
Y	US 2004/02381 10 A1 (FLANAGAN) 02 December 2004 (02 12 2004) para [0048], [0050], [0051], [0058], [0071], [0075], Fig 3, 5E	1-21
Y	US 2003/0063884 A1 (SMITH et al) 03 April 2003 (03 04 2003) para [0006], [0008], [0120]	4, 5, 7, 14, 18, 20
Y	US 2002/0163735 A1 (DETLEF et al) 07 November 2002 (07 11 2002) para [0268], [0286], [0289], [0296], [0297], [0316]	6, 7, 9, 18, 21
Y	US 4,261,657 A (REIBACK) 14 April 1981 (14 04 1981) col 2, ln 4-6, col 4, ln 20-25, col 5, ln 56-64	11

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	US 2002/0033993 A1 (FURUKAWA et al) 21 March 2002 (21 03 2002) para [0033], [0051]	15, 16
Y	US 5,171,400 A (MAGEL et al) 15 December 1992 (15 12 1992) col 3, ln 55-57, col 7, ln 52-60	17