Editorial

50th Anniversary of the Laser

The year 2010 marks the 50th anniversary of the first discovery of the laser (1). Today, solid state lasers dominate the laser market and one of the most widely used types is the yttrium aluminium garnet (YAG) laser. Platinum group metals (pgms) play a vital role in the production of these lasers – monocrystalline YAG is grown in iridium crucibles, whose chemical compatibility with molten oxides in slightly oxidising conditions allows single crystals to be grown with the optical and chemical purity required for laser applications (2, 3).

A look through the *Platinum Metals Review* archive reveals that this is not the end of the story for pgms and lasers.YAG lasers are used for welding jewellery alloys (4) and as John Wright points out in this issue of *Platinum Metals Review*, the best equipped jewellery manufacturers may have both laser and pulse argon arc welders in their workshops (5). Laser welding is a relatively new technique, and jewellers can design appropriately to take advantage of its unique attributes. Platinum's low thermal diffusivity means that there is a very narrow heat-affected zone, thus it is possible to preserve work hardening at the end of the manufacturing process or for jewellery repair, and laser welds can be made close to gemstones and delicate components without damaging them (6). Iridium itself can be welded by laser for uses as diverse as spark plug electrodes, nuclear fuel containers and, appropriately, crucibles for crystal growth (7).

Manufacturing processes can also benefit from laser technology. Ceramic substrates used to make glass manufacturing equipment can be coated with a platinum-rhodium alloy, and are laser drilled prior to coating to ensure a strong, uniform adhesion of the coating (8).

Lasers can play a role in developing or improving pgm materials for a variety of applications. The laser flash method uses a ruby laser to measure thermal conductivity of pgms and their alloys, as a way to determine their suitability for ultra high-temperature structural applications among others (9, 10). Laser-based techniques can even be used to study the behaviour of pgms in naturally occurring mineral deposits (11).

Lasers are a symbol of modern life and pervade all aspects of today's society, from the familiar CDs and DVDs to broader applications in manufacturing, medicine and science (1). The opportunities that are opened up in diverse applications of the pgms – and even in the study of pgm ores – mean that lasers and pgms should have a long future together.

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References

1 T. W. Hänsch, *Laser Photon. Rev.*, 2010, **4**, (1), A5

2 B. Cockayne, *Platinum Metals Rev.*, 1968, **12**, (1), 16

3 B. Cockayne, *Platinum Metals Rev.*, 1974, **18**, (3), 86

4 J. C. Wright, *Platinum Metals Rev*, 2002, **46**, (2), 66

5 J. C. Wright, *Platinum Metals Rev.*, 2010, **54**, (4), 266

6 D. Miller, K. Vuso, P. Park-Ross and C. Lang, *Platinum Metals Rev.*, 2007, **51**, (1), 23

7 E. K. Ohriner, *Platinum Metals Rev.*, 2008, **52**, (3), 186

8 C. Couderc, *Platinum Metals Rev.*, 2010, **54**, (3), 186

9 Y. Terada, K. Ohkubo and T. Mohri, *Platinum Metals Rev.*, 2005, **49**, (1), 21

10 Y. Terada, *Platinum Metals Rev.*, 2008, **52**, (4), 208

11 D. A. Holwell and I. McDonald, *Platinum Metals Rev.*, 2010, **54,** (1), 26