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applied optics

27.5 W/m^2 collection efficiency solar laser using a diffuse scattering cooling liquid: erratum

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In this erratum we clarify our previously published paper [Appl. Opt. 57, 4008 (2018)], where we used a solar spectrum truncated to a maximum wavelength of 830 nm in the numerical modelling, but did not state this in the paper. Here, we present a graph of the numerically modelled absorption in the Nd:YAG rod as a function of the diffuse reflectivity of the chamber walls using the full solar spectrum, confirming that the theoretical maximum possible absorption we predict is in agreement with literature values. © 2020 Optical Society of America

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In [1], collection efficiency solar laser using a diffuse scattering cooling liquid," Fig. 2 displays a computational model generated graph of the percentage of solar rays absorbed in the Nd:YAG rod as a function of the reflectivity of the diffuse scatterer in contact with the side wall of the rod [1]. This figure was generated using a standard AM 1.5 solar spectrum that was truncated to a maximum wavelength of 830 nm to increase computational efficiency. This wavelength is slightly above the maximum absorption wavelength in Nd:YAG and contains 59.5% of the total power in the solar spectrum. We did not state in Ref. [1] that a truncated spectrum had been used in the model.

Figure 1 is the equivalent graph of the modelled absorbed rays as a function of the reflectivity of the diffuse scatterer with the entire solar spectrum considered.

The modelled absorption, reaches a maximum of 15% for 100% side wall diffuse reflectivity. This is slightly lower than the maximum possible absorption in Nd:YAG of 16%, when only the spectral overlap of the absorption spectrum of Nd:YAG with the solar spectrum is considered [2,3]. The difference is due to the additional loss from the Fresnel transmission of rays interacting with the end faces of the laser rod.

With regards to Table 1 in Ref. [1] where we report the experimentally measured loss from our collection optics we would like to reiterate that all losses, including the total loss, were individually experimentally measured and none calculated.

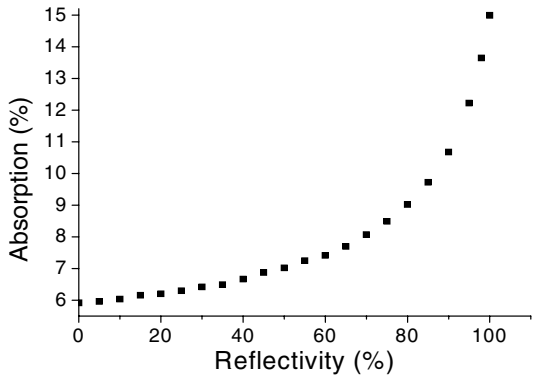

Fig. 1. Modelled percentage of the entire solar spectrum absorbed by the Nd:YAG rod as a function of reflectivity of the diffuse scatterer in contact with the side wall of the rod.

REFERENCES

1. C. J. C. Smyth, S. Mirkhanov, A. H. Quarterman, and K. G. Wilcox, "27.5 W/m^2 collection efficiency solar laser using a diffuse scattering cooling liquid," Appl. Opt. **57**, 4008–4012 (2018).
2. B. Zhao, C. Zhao, J. He, and S. Yang, "The study of active medium for solar-pumped solid-state lasers," Acta. Opt. Sin. **2007**, 1–9 (2006).
3. J. Almeida and D. Liang, "Design of TEM$_{00}$ mode side-pumped Nd:YAG solar laser," Opt. Commun. **333**, 219–225 (2014).