

Study on Solar Pumped Fiber Optical Devices for Maintaining Essential Optical Communications during Disasters

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Abstract

The aim of this paper is to enable solar energy (green energy) for designing the fiber-optic laser and amplifier. Collection of sunlight as the pump lasers are lunched into fiber laser and fiber amplifier, respectively. Fiber lasers and fiber amplifiers are designed based on solar pumping and various gained fibers. The operation wavelength of fiber devices is decided by the pumped wavelengths which we selected. For examples, the 980 nm solar pumped is for 1550 nm Erbium doped fiber devices as well as for 1064 nm Ytterbium doped fiber devices. To facilitate free space communication using solar pumped fiber amplifier and fiber lasers in the absence of electric power, especially during natural disasters, solar energy can be stored using a battery and which can be used to maintain an uninterruptible communication setup. To improve the pump slope efficiency, we designed a multi-input pumped power from different ports/positions to collect much more solar power. Parameters such as the pump slope efficiency, gain and noise figure for fiber amplifier or fiber laser are analyzed. The performance is tested in cloudy days, rainy days and sunny days for comparison. The fiber devices may be used for applications in uninterruptible fiber optic communication systems during disasters..

Keywords—*Solar pumped, fibre amplifier, fibre laser, optical communication, disasters*

Professional Biography

Shien-Kuei (Peter) Liaw received double doctorate degrees from National Chiao-Tung University in photonics engineering and from National Taiwan University in mechanical engineering. Prof. Liaw joined the National Taiwan University of Science and Technology (NTUST) in 2000. He has then been the Director of both the Optoelectronics Research Center and the Technology Transfer Center there. He was a visiting researcher at Bellcore (now Telcordia), USA in 1996 for six months and a visiting Professor at University of Oxford, UK for three months in 2011.

He has forty U.S./Taiwan/China patents and more than 250 journal articles and international conference presentations. He actively contributes to many conferences as technical program chair, international advisory committee and/or keynote speaker. Right now, Dr. Liaw is a distinguished Professor at National Taiwan University of Science and Technology, President of the Optical Society (OSA) in Taiwan Chapter and the Secretary-General of the Taiwan Photonic Society.



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Any Comments:

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