

# Zinc Oxide In Polymethylmethacrylate as Passive Saturable Absorber For Q-Switched Erbium Doped Fiber Laser

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## Background

Saturable absorbers (SAs) are a nonlinear optical material with an optical loss, that decreases at a high intensity of light. It is used as an alternative to generate a pulse laser, due to the simple circuit and low cost. Zinc Oxide has been seen as a potential SA due to its large optical non-linearity and high stability that able to generate an excellent pulsed laser.

## Literature Review

ZnO favorable properties which is hexagonal lattice dynamics as well as the energy band structure (ZnO has direct bandgap of 3.4eV and exciton binding energy of 60 meV at room temperature) make it highly suited towards optical applications.

## Methodology

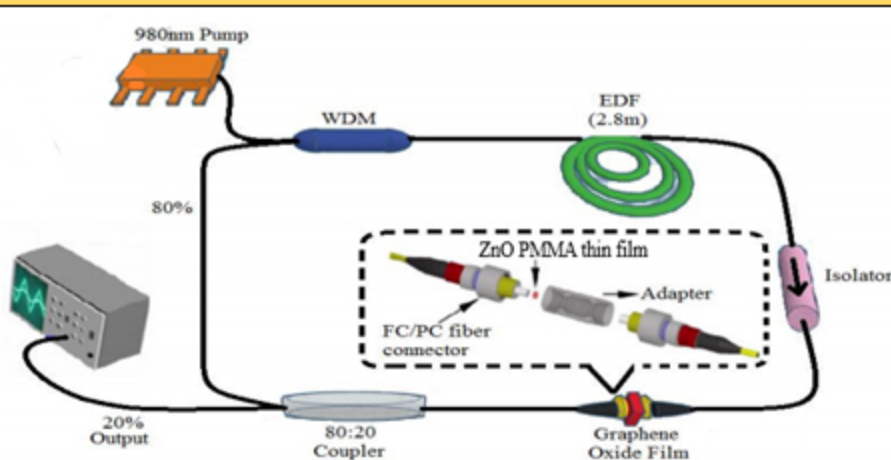
### Zinc Oxide Fabrication

Zinc Nitrate Hexahydrate +  
Hexamethylenetetramine + De-ionized  
Water

Stir for 15 minutes, then place in beaker

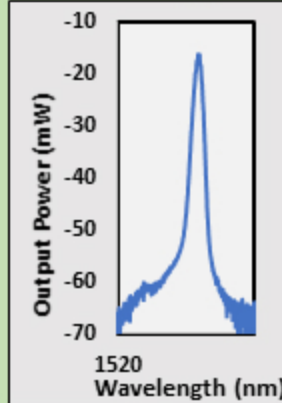
Place in Oven for 5 hour

### Experiment Set Up



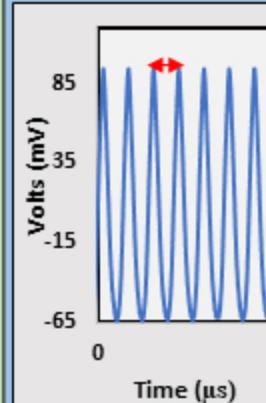
## Results

### Pulse Wavelength



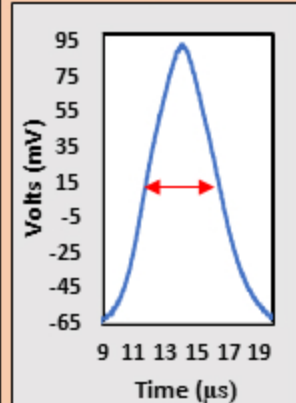
1559.3nm

### Pulse train

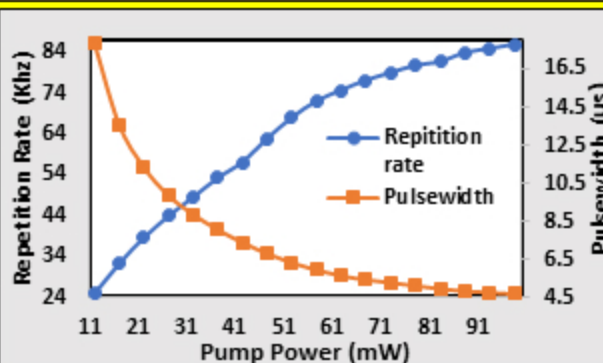


11.64µs

### Single Envelop

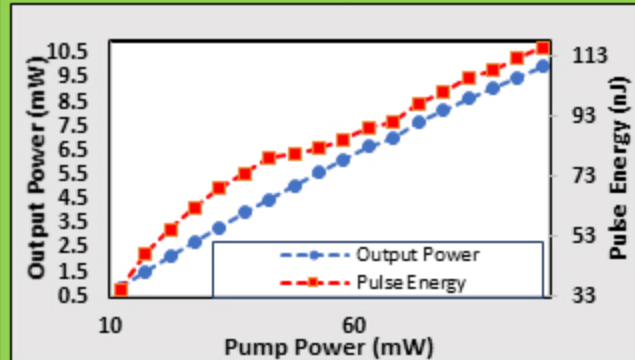


4.9µs



Repetition Rate and Pulse Width in a Function of Pump Power

### Peak Power and Pulse Energy in a Function of Pump Power



## Conclusion

Q-switched ring EDFL was successfully demonstrated by using Zinc Oxide in Polymethylmethacrylate where it feature a low threshold due to large third-order optical response with a fast response time

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