Abstract Submitted
for the NWS15 Meeting of
The American Physical Society

Zinc Oxide Random Lasers: Threshold Enhancement and Operational Stability ZACHARIAH PETERSON, ROBERT WORD, ROLF KÖNENKAMP, Portland State University — Both incoherent and coherent laser emission have been observed from a number of zinc oxide (ZnO) nanostructures. Our initial results show enhanced optical feedback in optically pumped ZnO nanoparticle films with the addition of scattering magnesium oxide (MgO) nanoparticles. The emission intensity, as well as the thresholds for line narrowing and amplification, all improve significantly. The effect of laser annealing on the lasing threshold was also investigated, as laser annealing has previously been shown to improve the optical properties of ZnO films. Laser annealing initially improves the lasing threshold and emission intensity. However, after some critical exposure the threshold deteriorates. The damage threshold is initially comparable to the lasing threshold, which brings into question the operating stability of these devices. Morphology changes are also observed to accumulate due to laser annealing. In order to resolve spectra from our random lasers, we show that certain modes can be excluded from emission spectra using a microscope objective with an adjustable internal aperture. Further work will focus on more methods for enhancing the lasing threshold and establishing highly stable operating conditions in ZnO random lasers.

Zachariah Peterson
Portland State Univ

Date submitted: 13 Apr 2015 Electronic form version 1.4