Abstract Submitted
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Enhancing lasing action in nanoscale zinc oxide random media using atomic layer deposition.[1] BIBEK S DHAMI, KARLY CASEY, University of Alabama at Birmingham, MATTHEW Y. SFEIR, Advanced Science Research Center, City University of Newyork, KANNATASSEN APPAVOO, University of Alabama at Birmingham — Understanding how near-field environment modify carrier dynamics and resulting emission properties in nanophotonic elements is vital, especially for lasing applications. Here we have fabricated thin film of zinc oxide nanospheres with high crystal quality and modified its near-field environment by performing atomic layer deposition of various dielectrics, including zinc oxide as a control. By measuring steady-state emission of our nanoscale samples, we demonstrate that we can vary lasing threshold by more than 20 percent. Furthermore, we conduct ultrafast transient absorption spectroscopy above and below lasing threshold to understand how surface modifications using with atomic layer processing modifies carrier dynamics of our lasing media. Three-dimensional finite-difference time domain electromagnetic simulations were performed to gain further physical insights into near-field effects on emission properties of nanoscale random media.

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Bibek S Dhami
University of Alabama at Birmingham

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