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# Characterization of Novel Photoresists for STED-enhanced Nanolithography

Brandon Franz, Paul Somers, and Xianfan Xu  
School of Mechanical Engineering, Purdue University

## ABSTRACT

Stimulated emission depletion (STED) applied to nanolithography has greatly improved achievable resolutions and quality of nanoscale structures. The special resin used, called a photoresist, is currently the major limiting factor in further improvement in resolution and structure quality. Characterizing new formulations of photoresists and comparing their performance in STED-enhanced nanolithography to the performance of current formulations will allow for greater resolution and structure quality. With each photoresist, line structures are produced with a two-laser system including a writing, or excitation, laser and a depletion, or STED, laser. The line structures are exposed to the STED laser for a short duration in each experiment. The average powers of the excitation and STED lasers are varied to obtain a writing and depletion threshold where quality and resolution are observable through scanning electron microscope (SEM) imaging. A photoresist currently used was compared to the same photoresist with the stabilizing photoinhibitor removed. The photoresist with the photoinhibitor removed demonstrated promising characteristics, however further experimentation is required to determine whether the new photoresist is better suited for STED-enhanced nanolithography.

## KEYWORDS

Photoresist, stimulated emission depletion, lithography, nanofabrication