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Photoinduced Heating Enhancement of Metallic Glass Nanowires CEREN UZUN, CHANDRA SEKHAR MEDURI, NILOOFAR KAHLER, LUIS GRAVE DE PERALTA, Texas Tech University, JENA M. MCCOLLUM, University of Colorado Colorado Springs, MICHELLE PANTOYA, Texas Tech University, GOLDEN KUMAR, University of Texas at Dallas, AYRTON A. BERNUSSI, Texas Tech University — Materials with high photo-thermal efficiency are essential in a wide variety of applications from medicine to renewable energy. Photo-thermal materials effectively absorb and convert light into heat. Nanostructures have proven to enhance absorption and heat retention owing to their large surface areas and restricted heat pathways. Here, we demonstrate that the optical absorption and heat conversion in near-infrared can be enhanced by using metallic glass nanowires whose geometry can be readily tailored through thermoplastic molding. Infrared thermography measurements and heat transport simulations reveal that the photoinduced temperature rise can be amplified by increasing the length of nanowires and decreasing the thickness of the supporting substrate. Temperature above 500C can be rapidly achieved to induce a controlled phase transformation from amorphous to crystalline state in metallic glass nanowires while maintaining their geometrical integrity. Photo-induced temperature rise can be used in optical ignition applications as demonstrated by an example of thermite powder.

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