

# Graphene-based optical modulators poised to break speed limits in digital communications

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In yet another astounding application of the "wonder material" graphene, scientists at the University of California, Berkeley discovered that it makes an excellent active media for optical modulators. Graphene-based modulators are expected to significantly enhance ultrafast optical communication and computing. team will report on their findings at the Optical Fiber Communication Conference and Exhibition/National Fiber Optic Engineers Conference ([OFC/NFOEC](#)) taking place next week in Los Angeles.

Modulators play a vital role in communications due to their switching ability, because this is what controls the speed that [data packets](#) can travel through networks. As the speed of data pulses sent out increases, it means that greater volumes of information can be transmitted.

"We demonstrated a graphene-based [optical modulator](#) with a broad optical bandwidth (1.35-1.6  $\mu\text{m}$ ), a small device footprint (25  $\mu\text{m}^2$ ), and high operational speed (1.2 GHz at 3dB) under ambient conditions—all of which are essential for optical interconnects for future integrated optoelectronic systems," says Ming Liu, a post-doctoral researcher working at UC Berkeley's NSF Nanoscale Science and Engineering Center. "The modulation efficiency of a single layer of a hexagonal carbon atom is already comparable to, if not better than, traditional semiconductor materials, which are orders of magnitude larger in active volume."

Looking into future applications, graphene-based modulators could be

very compact and potentially perform at speeds up to 10 times faster than today's technology allows. They may someday enable consumers to stream full-length, high-definition, 3-D movies onto their smartphones within mere seconds.

**More information:** Liu's talk, "Graphene-based optical modulators," takes place Tuesday, March 6 at 3:30 p.m. in the Los Angeles Convention Center.

Provided by Optical Society of America

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