

# Graphene microphone outperforms traditional nickel and offers ultrasonic reach

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Generic microphone on sound desk is shown. Credit: Pixabay 2015, CC0

Scientists have developed a graphene based microphone nearly 32 times more sensitive than microphones of standard nickel-based construction.

The researchers, based at the University of Belgrade, Serbia, created a vibrating [membrane](#) - the part of a condenser [microphone](#) which converts the sound to a current - from graphene, and were able to show up to 15 dB higher sensitivity compared to a commercial [microphone](#), at frequencies up to 11 kHz.

The results are published today, 27th November 2015, in the journal *2D Materials*.

"We wanted to show that graphene, although a relatively new material, has potential for real world applications" explains Marko Spasenovic, an author of the paper. "Given its light weight, high mechanical strength and flexibility, graphene just begs to be used as an acoustic membrane material."

The graphene membrane, approximately 60 layers thick, was grown on a nickel foil using [chemical vapour deposition](#), to ensure consistent quality across all the samples.

During membrane production, the nickel foil was etched away and the graphene membrane placed in the same housing as a commercial microphone for comparison. This showed a 15 dB higher sensitivity than the commercial microphone.

The researchers also simulated a 300-layer thick graphene membrane, which shows potential for performance far into the ultrasonic part of the spectrum.

"The microphone performed as well as we hoped it would" adds Spasenovic. "A thicker [graphene membrane](#) theoretically could be stretched further, enabling ultrasonic performance, but sadly we're just not quite there yet experimentally."

"At this stage there are several obstacles to making cheap graphene, so our microphone should be considered more a proof of concept" concludes Spasenovic. "The industry is working hard to improve graphene production - eventually this should mean we have better microphones at lower cost."

**More information:** 'Multilayer graphene condenser microphone' *2D Mater.* 2 045013, 27 November, [iopscience.iop.org/2053-1583/2/4/045013](https://iopscience.iop.org/2053-1583/2/4/045013).

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