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A low-noise biomimetic differential microphone

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A miniature differential microphone is described that has a noise floor that is substantially lower than that of existing devices of comparable size. The sensitivity of a differential microphone suffers as the distance between the two pressure sensing locations decreases, resulting in an increase in the input sound pressure-referred noise floor. In the microphone described here, the two sources of microphone internal noise, the diaphragm thermal noise and the electronic noise, are minimized by a combination of novel diaphragm design and the use of low-noise optical sensing. The differential microphone diaphragm measures 1 mm by 2 mm and is fabricated out of polycrystalline silicon. The diaphragm design is based on the coupled ears of the fly *Ormia ochracea*. The sound pressure input-referred noise floor of this miniature differential microphone has been measured to be less than 36 dBA.