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Flexible low-power RF nanoelectronics in the GHz regime using CVD MoS2 MARUTHI YOGEESH, University of Texas at Austin — Two-dimensional (2D) materials have attracted substantial interest for flexible nanoelectronics due to the overall device mechanical flexibility and thickness scalability for high mechanical performance and low operating power. In this work, we demonstrate the first MoS2 RF transistors on flexible substrates based on CVD-grown monolayers, featuring record GHz cutoff frequency (5.6 GHz) and saturation velocity (˜1.8106 cm/s), which is significantly superior to contemporary organic and metal oxide thin-film transistors. Furthermore, multicycle three-point bending results demonstrated the electrical robustness of our flexible MoS2 transistors after 10,000 cycles of mechanical bending. Additionally, basic RF communication circuit blocks such as amplifier, mixer and wireless AM receiver have been demonstrated. These collective results indicate that MoS2 is an ideal advanced semiconducting material for low-power, RF devices for large-area flexible nanoelectronics and smart nanosystems owing to its unique combination of large bandgap, high saturation velocity and high mechanical strength.

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