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# **S-curve engineering for ON-state performance using anti-ferroelectric/ferroelectric stack negative-capacitance FinFET**

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## **Abstract**

This work investigates the S-curve engineering by exploiting the anti-ferroelectric (AFE)/ferroelectric (FE) stack negative-capacitance FinFET (NC-FinFET) to improve both the subthreshold swing and ON-state current ( $I_{ON}$ ). Our study indicates that the AFE/FE gate-stack can theoretically achieve surprising improvements to the OFF-state current ( $I_{OFF}$ ) and  $I_{ON}$  relative to IRDS projections. There is significant long-term advantage to IC power consumption and speed if materials with certain AFE and FE characteristics can be developed and introduced into IC manufacturing.