

A new Si:C epitaxial channel nMOSFET architecture with improved drivability and short-channel characteristics

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We present for the first time epitaxially grown Si:C nMOSFET channels acting as boron blocking barriers containing up to 1.4% substitutional carbon. The high impact of interstitial carbon and epitaxial growth conditions on electron inversion layer mobility is demonstrated. We achieved super-retrograde channel and pockets profiles for improved short channel effects control. This allows improved I_{ON}/I_{OFF} ratio as compared to non-carbonated short channel devices without any degradation of transport properties or gate oxide integrity.