Void Free and Low Stress Shallow Trench Isolation Technology using P-SOG for sub 0.1 ㎛ Device

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Highly reliable Void Free Shallow Trench Isolation (VF-STI) technology by employing Polysilazane based inorganic Spin-On-Glass (P-SOG) is developed for sub 0.1 ㎛ devices. In order to overcome the difficulties from the gap-filling and accumulated mechanical stress in STI, P-SOG pillar is introduced at the trench bottom. As a result, P-SOG pillar having low stress improves data retention time and hot carrier immunity in 256 Mbit DRAM by reducing cumulative STI stress. In addition, VF-STI shows an excellent extendibility in terms of gap filling capability even at the aspect ratio of more than 10 without void formation.