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ANISOTROPIC NITRIDE ETCH PROCES WITH HIGH SELECTIVITY TO OXIDE AND PHOTORESIST LAYERS IN A DAMASCENE ETCH SCHEME

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ABSTRACT

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A process and etchant gas composition for anisotropically etching a trench in a silicon nitride layer (31) of a multilayer structure (30). The etchant gas composition has an etchant gas including a polymerizing agent, a hydrogen source, an oxidant, and a noble gas diluent. The constituents are added in amounts to achieve an etchant gas having a high nitride selectively to silicon oxide and photoresist. A power source, such as an RF power source (43), is applied to the structure (Fig.4A) to control the directionality of the high density plasma (42) formed by exciting the etchant gas. The power source (43) that controls the directionality of the plasma is decoupled from the power source (41) used to excite the etchant gas. The etchant gas can be used during a nitride etch step in a process for making a metal oxide semiconductor field effect transistor.

Fig.3