We show that surface arc-discharge deposited carbon plays a critical intermediary role in the breakdown of thermally grown oxide diffusion barriers of 90 nm on a silicon wafer at 1035°C in an Ar/H2 atmosphere, resulting in the formation of epitaxial copper silicide particles in ≈ 10 μm wide channels, which are aligned with the intersections of the (100) surface of the wafer and the (110) planes on an oxidized silicon wafer, as well as endotaxial copper silicide nanoparticles within the wafer bulk. We apply energy dispersive x-ray spectroscopy, in combination with scanning and transmission electron microscopy of focused ion beam fabricated lammelas and trenches in the structure to elucidate the process of their formation.

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