($SiCl_4$), among others. For example, silicon may be deposited onto the surface by pyrolyzing silane (SiH_4) in a temperature range between about 550°C and about 690°C, such as between about 580°C and about 650°C. The chamber pressure may range from about 70 to about 400 mTorr.

[0044] A boron-containing gas may be introduced into the epitaxial reactor to dope the epitaxial layer with boron. In some embodiments, the resulting epitaxial structure (i.e., substrate and epitaxial layer) is doped with boron at concentrations sufficient to achieve a p/p+ epitaxial wafer. The epitaxial layer may have a reduced number of grown-in defects or may be substantially free of grown-in defects.

[0045] Compared to other methods for forming a substrate for silicon epitaxial growth and methods for forming an epitaxial wafer, the methods of the present disclosure have several advantages. Heavily doping the substrate with boron (e.g., a boron concentration of 2.8 x 10^{18} atoms/cm^3 or more) has been found to suppress the formation of interstitial-type dislocation loops. Heavily doping the substrate with boron has also been found to enhance oxygen precipitation. In vacancy rich regions, oxygen precipitation is further enhanced (i.e. larger precipitates form). Enhancement increases with higher vacancy concentrations. It is believed that grown-in defects in the epitaxial layer deposited on a substrate heavily-doped with boron are significantly caused by large oxygen precipitates at the surface of the single crystal silicon substrate upon which the epitaxial layer is grown. These large oxygen precipitates, which may be associated with dislocation loops or tangles, are not dissolved during