ABSTRACT

APPARATUS AND METHOD FOR USING A VISCOELASTIC CLEANING MATERIAL TO REMOVE PARTICLES ON A SUBSTRATE

The embodiments provide apparatus and methods for removing particles from a substrate surface, especially from a surface of a patterned substrate (or wafer). The cleaning apparatus and methods have advantages in cleaning patterned substrates with fine features without substantially damaging the features on the substrate surface. The cleaning apparatus and methods involve using a viscoelastic cleaning material containing a polymeric compound with large molecular weight, such as greater than 10,000 g/mol. The viscoelastic cleaning material entraps at least a portion of the particles on the substrate surface. The application of a force on the viscoelastic cleaning material over a sufficiently short period time causes the material to exhibit solid-like properties that facilitate removal of the viscoelastic cleaning material along with the entrapped particles. A number of forces can be applied over a short period to access the solid-like nature of the viscoelastic cleaning material. Alternatively, when the temperature of the viscoelastic cleaning material is lowered, the viscoelastic cleaning material also exhibits solid-like properties.

FIG. 3C