marks placed at specific distances from the periphery of the semiconductor substrate, which allow a quantitative measurement of the width of removed photoresist edge bead to be determined.

[0013] **FIG. 3**, which schematically in cross-sectional style, shows the scribe marks in the monitor semiconductor substrate, specifically showing the width of photoresist edge bead removed via observance of the specific, uncovered scribe mark, closest to the photoresist layer.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] The process used to monitor and control the width of photoresist edge bead removed at the periphery of a photoresist semiconductor substrate, as well as the test vehicle used for quantitative evaluation of the width of the photoresist edge bead removed, will now be described in detail. A semiconductor substrate **1**, to be used only for monitoring the extent, or width, of the photoresist edge bead removed, is described, and schematically shown in FIGS. **1-2**. Three sets of scribe marks, **2***a*, **2***b*, and **2***c*, are formed in semiconductor substrate **1**, at three positions, with set **2***a*, directly opposite semiconductor flat **11**, and with set **2***b*, and **2***c*, placed +90° and −90°, from set **2***a*. This is shown schematically in **FIG. 1**.

[0015] Each set of scribe marks is formed via laser procedures, to a depth in semiconductor substrate **1**, between about 2 to 3 um. Each set is comprised of five laser scribed marks, with each mark comprised at a width **8**, of about 0.11 mm. Width **7**, identifying the space between scribe marks, in a specific set, is between about 0.75 to 1.25 mm. Space **6**, between about 0.75 to 1.25 mm, identifies the distance or space between the scribe mark closest to the periphery of semiconductor substrate **1**, and the periphery of semiconductor substrate **1**. Each mark is also numbered, via laser scribing, with the mark closest to the periphery scribed number **1**, and with the mark furthest from the periphery labelled number **5**. Length **5**, comprised of the length of each scribe mark, including the length of scribed identifying number, is between about 3.75 to 4.25 mm. These features are schematically shown for set **2***a*, in **FIG. 2**. The features of the scribed marks, regarding depth, width, space, etc, are designed to allow observation of a specific mark, uncovered as a result of the photoresist edge bead removal procedure, with the specific mark allowing a quantitative evaluation of the width of the edge bead removal to be established.

[0016] The method of performing the removal of, the monitoring of, and the controlling of, a photoresist edge bead, is now detailed, and described schematically in **FIG. 3**. Product semiconductor substrates, those substrates comprised of numerous, identical pieces, or chips, which in turn are comprised with defined electronic circuitry, in addition to monitor semiconductor substrate **1**, are coated with photoresist layer **9**, at a thickness between about 0.5 to 7.0 um, via conventional photoresist application procedures. A solvent, such as 2-methoxy-1-methylethyl acetate is then ejected from a solvent nozzle, directed at the portion of photoresist layer **9**, located near the periphery of semiconductor substrate **1**, as well directed at the same location for the product semiconductor substrates. The amount of solvent ejected, as well as the location on photoresist layer **9**, in which the solvent is being ejected on, is dependent on the desired width of photoresist layer **9**, to be removed. The success of the photoresist edge bead removal procedure is next evaluated using monitoring semiconductor substrate **1**. Region **10**, of monitoring semiconductor substrate **1**, indicates the exposed portion of scribe mark, set **2***a*, where for this example the width of the removed photoresist edge bead extends from the periphery of semiconductor substrate **1**, to a location between scribe mark **2** and scribe mark **3**, corresponding to a removed portion of between about 2 to 3 mm. The observance of the location of exposed scribe marks is accomplished via the naked eye, however only for monitoring semiconductor substrate **1**. Therefore if the reading of the width of the removed edge bead is acceptable, the product semiconductor substrates experiencing the identical photoresist edge bead removal procedure can continue to be processed without subjection to possible contamination occurring during examination of the width of the photoresist edge bead. However if the width of the removed portion of photoresist edge bead is not correct, the product semiconductor, as well as monitoring semiconductor substrate **1**, can be reworked, regarding stripping of the photoresist layer, followed by re-application, edge bead removal, and monitoring of the removal width. The use of the monitoring semiconductor substrate allows a quantitative assessment of the width of the removed photoresist edge bead, allowing specific removed widths to be obtained for specific photolithographic steps. For example for a first case a wider, removed region is needed to allow increased contact between the substrate and a clamp used in a dry etching tool, in contrast to a second case in which only a narrow photoresist edge bead needs to be removed.

[0017] The use of a monitor wafer to determine the width of the edge bead removal procedure does not have to be implemented with every product job. For example a monitor wafer can be used at specific frequencies, for example once a day, or once for every four product jobs, to monitor photolithographic procedures, or to qualify a specific photolithographic tool. In addition the use of scribe marks to determine the extent of edge bead removal can also be accomplished via use of scribe marks on product wafers. A mark can be formed on the product wafer to show a maximum acceptable limit of the width of the edge band removal. For example if a product's maximum acceptable edge bead removal width is 2 mm, then only a scribe mark at 2 mm from the product wafer edge will be used at one or more locations around the periphery of the wafer. If the product requires both a minimum and maximum limit, regarding edge bead removal width, then two scribe marks, formed at specific locations around the periphery of the product wafer are employed.

[0018] While this invention has been particularly shown and described with reference to, the preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made without departing from the spirit and scope of this invention.

What is claimed is:

1. A method of monitoring the width of a portion of photoresist layer removed from the periphery of a substrate during a photoresist edge bead removal procedure, comprising the steps of:

preparing a monitoring substrate comprised with sets of scribe marks, with all scribe marks formed to a specific