WHAT IS CLAIMED IS:

1. A wafer processing method for dividing a wafer along a plurality of division lines to obtain a plurality of individual device chips, the division lines being formed on a front side of the wafer to thereby define a plurality of separate regions where a plurality of devices are individually formed, the wafer processing method comprising:

a ring frame preparing step of preparing a ring frame having an inside opening for accommodating the wafer;

a polyester sheet providing step of positioning the wafer in the inside opening of the ring frame and providing a polyester sheet having no adhesive components on a back side or the front side of the wafer and on a back side of the ring frame, such that the polyester sheet is in direct contact with the back side or the front side of the wafer and the back side of the ring frame;

a uniting step of heating the polyester sheet as applying a pressure to the polyester sheet after performing the polyester sheet providing step, thereby uniting the wafer and the ring frame through the polyester sheet by thermocompression bonding to form a

frame unit in a condition where the wafer and a front side of the ring frame are exposed upward;

a dividing step of positioning a focal point of a laser beam inside the wafer, the laser beam having a transmission wavelength to the wafer, and applying the laser beam to the wafer along each division line, thereby sequentially forming a plurality of shield tunnels in the wafer along each division line to divide the wafer into the individual device chips, after performing the uniting step; and

a pickup step of applying an ultrasonic wave to the polyester sheet in each region of the polyester sheet corresponding to each device chip, pushing up each device chip through the polyester sheet, and picking up each device chip from the polyester sheet after performing the dividing step.

2. The wafer processing method according to claim 1, wherein the uniting step includes a step of applying infrared light to the polyester sheet, thereby performing the thermocompression bonding.

3. The wafer processing method according to claim 1, wherein the polyester sheet is larger in size than the ring frame, and the uniting step includes an additional step of cutting the polyester sheet after heating the

polyester sheet, thereby removing a part of the polyester sheet outside an outer circumference of the ring frame.

4. The wafer processing method according to claim 1, wherein the pickup step includes a step of expanding the polyester sheet to thereby increase a spacing between any adjacent ones of the device chips.

5. The wafer processing method according to claim 1, wherein the polyester sheet is formed of a material selected from the group consisting of polyethylene terephthalate and polyethylene naphthalate.

6. The wafer processing method according to claim 5, wherein the polyester sheet is formed of polyethylene terephthalate, and the polyester sheet is heated in the range of 250°C to 270°C in the uniting step.

7. The wafer processing method according to claim 5, wherein the polyester sheet is formed of polyethylene naphthalate, and the polyester sheet is heated in the range of 160°C to 180°C in the uniting step.

8. The wafer processing method according to claim 1, wherein the wafer is formed of a material selected from the group consisting of silicon, gallium nitride, gallium arsenide, and glass.