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 on a back 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 of the wafer and the back side of the ring frame, without an adhesive layer provided between the back side of the wafer and the polyester sheet and between the back side of the ring frame and the polyester sheet;

a uniting step of heating the polyester sheet while 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 front side of the wafer and a front side of the ring frame are exposed;

a dividing step of cutting the wafer along each division line by using a cutting apparatus including a rotatable cutting blade after performing the uniting step, thereby dividing the wafer into the individual device chips; and

a pickup step of blowing out air from the polyester sheet side to push up each device chip 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.

9. 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 decline 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 layer on a back side of the wafer and on a back side of the ring frame, without an adhesive layer provided between the back side of the wafer and the polyester sheet and between the back side of the ring frame and the polyester sheet;

a uniting step of heating the polyester sheet while 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 front side of the wafer and a front side of the ring frame are exposed;

a dividing step of cutting the wafer along each division line by using a cutting apparatus including a rotatable cutting blade after performing the uniting step, thereby dividing the wafer into the individual

device chips; and

a pickup step of blowing out air from the polyester sheet side to push up each device chip and picking up each device chip from the polyester sheet after performing the dividing step;

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.

10. 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 layer on a back side of the wafer and on a back side of the ring

frame, without an adhesive layer provided between the back side of the wafer and the polyester sheet and between the back side of the ring frame and the polyester sheet;

a uniting step of heating the polyester sheet while 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 front side of the wafer and a front side of the ring frame are exposed;

a dividing step of cutting the wafer along each division line by using a cutting apparatus including a rotatable cutting blade after performing the uniting step, thereby dividing the wafer into the individual device chips; and

a pickup step of blowing out air from the polyester sheet side to push up each device chip and picking up each device chip from the polyester sheet after performing the dividing step;

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.