WHAT IS CLAIMED IS:

1. A method of processing a wafer formed with a plurality of division lines on a front surface of a single crystal substrate having an off angle and formed with respective devices in a plurality of regions partitioned by the division lines, the method comprising:

a numerical aperture setting step of setting a numerical aperture (NA) of a focusing lens for focusing a pulsed laser beam so that a value obtained by dividing the numerical aperture (NA) by a refractive index (N) of the single crystal substrate falls within range from 0.05 to 0.2;

a shield tunnel forming step of applying the pulsed laser beam along the division lines from a back side of the single crystal substrate, with a focal point of the pulsed laser beam positioned at a desired position from a back surface of the single crystal substrate, so as to form shield tunnels each composed of a pore and a pore-shielding amorphous portion along the division lines from the focal point positioned inside the single crystal substrate; and

a wafer dividing step of applying an external force to the wafer having been subjected to the shield tunnel forming step so as to divide the wafer along the division lines, along which the shield tunnels have been formed, into individual device chips.

2. The method of processing a wafer according to claim 1, further comprising a wafer supporting step of attaching a dicing tape to a back surface of the wafer and supporting an outer peripheral portion of the dicing tape by an annular frame, after the shield tunnel forming step is performed and before the wafer dividing step is performed.

3. The method of processing a wafer according to claim 1, wherein a film is provided to coat surfaces of the plurality of division lines formed on the front surface of the single crystal substrate constituting the wafer, and the method further

comprises a film splitting step of applying a laser beam with such a wavelength as to be absorbed in the film to the film along the division lines so as to split the film along the division lines, before the wafer dividing step is performed.

WHAT IS CLAIMED IS:

1. A method of processing a wafer formed with a plurality of division lines on a front surface of a single crystal semiconductor substrate having an off angle and formed with respective devices in a plurality of regions partitioned by the division lines, the method comprising:

a numerical aperture setting step of setting a numerical aperture (NA) of a focusing lens for focusing a pulsed laser beam so that a value obtained by dividing the numerical aperture (NA) by a refractive index (N) of the single crystal semiconductor substrate falls within range from 0.05 to 0.2;

a shield tunnel forming step of applying the pulsed laser beam along the division lines from a back side of the single crystal semiconductor substrate, with a focal point of the pulsed laser beam positioned at a desired position from a back surface of the single crystal semiconductor substrate, so as to form shield tunnels each composed of a pore and a pore-shielding amorphous portion along the division lines from the focal point positioned inside the single crystal semiconductor substrate; and

a wafer dividing step of applying an external force to the wafer having been subjected to the shield tunnel forming step so as to divide the wafer along the division lines, along which the shield tunnels have been formed, into individual device chips;

wherein a film is provided to coat surfaces of the plurality of division lines formed on the front surface of the single crystal semiconductor substrate constituting the wafer, and the method further comprises a film splitting step of applying a laser beam with such a wavelength as to be absorbed in the film to the film along the division lines so as to split the film along the division lines, before the wafer diving step is performed.

2. The method of processing a wafer according to claim 1, further comprising a wafer supporting step of attaching a dicing tape to a back surface of the wafer and supporting an outer peripheral portion of the dicing tape by an annular frame, after the shield tunnel forming step is performed and before the wafer dividing step is performed.