CLAIMS

[Claim1]
Method of radiatively cutting a wafer, the method comprising two cutting actions of low power cutting of two trenches followed by a high power cutting of a fissure between the two trenches, wherein a single pulsed radiation beam is split into at least two pulsed radiation beams for performing at least two of said cutting actions simultaneously in one pass.

[Claim 2]
Method according to claim 1, wherein the fissure is to be cut on the wafer in a cutting direction along a cutting street, wherein the single pulsed radiation beam is split into a first pulsed radiation beam for cutting the trenches and a second pulsed radiation beam for cutting the fissure, and wherein the first and second radiation beams are directed simultaneously with the first radiation beam leading and the second radiation beam trailing.

[Claim 3]
Method according to claim 2, wherein in synchronisation with the single pulsed radiation beam the first radiation beam is repetitively deflected in a deflection direction that is substantially transverse to the cutting direction, to intermittently cut two trenches at opposite sides of the cutting street in an interlaced manner.

[Claim 4]
Method according to claim 3, wherein the first radiation beam is deflected at a first deflection frequency equal to half the pulse repetition frequency (FP) of the single pulsed radiation beam.

[Claim 5]
Method according to claim 3 or 4, wherein the deflection of the first radiation beam is repetitively switched between a first deflection angle ($\theta 1$) and a second deflection angle ($\theta 2$).

[Claim 6]
Method according to any of claims 2-5, wherein in synchronisation with the single pulsed radiation beam the second radiation beam is repetitively deflected in a deflection direction that is substantially transverse to the cutting direction, to intermittently scan the width of the fissure between the two trenches formed by the first radiation beam.

[Claim 7]
Method according to claim 6, wherein the second radiation beam is deflected at a second deflection frequency equal to the pulse repetition frequency (FP) of the single pulsed radiation beam divided by an integer (N), wherein said integer (N) is equal to 2 or higher.

[Claim 8]
Method according to any of the preceding claims, wherein the single pulsed radiation beam is split into said first pulsed radiation beam for cutting trenches, said second pulsed radiation beam for cutting a fissure, and a third pulsed radiation beam for cutting trenches.

[Claim 9]
Method according to claim 8, the method comprising the steps of:

- in a first operational mode, cutting a fissure on the wafer in a first cutting direction along a cutting street, wherein the third radiation beam is inoperative and

the first and second radiation beams are directed to the same fissure simultaneously with the first radiation beam leading and the
second radiation beam trailing; and

- in a second operational mode, cutting another fissure on the wafer in a second cutting direction opposite the first cutting direction along another cutting street, wherein the first radiation beam is inoperative and the third and second radiation beams are directed to the same fissure
simultaneously with the third radiation beam leading and the second radiation beam trailing.

[Claim 10]

Method according to any of claims 1-7, wherein the single pulsed radiation beam is split into said first pulsed radiation beam for cutting trenches, said second pulsed radiation beam for cutting a fissure, and a third pulsed radiation beam for post-treatment to remove recast material that is formed during cutting of the fissure.

[Claim 11]

Method according to claim 10, wherein the third pulsed radiation beam is deflected in directions that are substantially transverse to a cutting direction along a cutting street.

[Claim 12]

Method according to any of the preceding claims, wherein at least one of the pulsed radiation beams is configured to be controllably deflectable in either a direction that is substantially parallel to the cutting direction or a direction that is substantially transverse to the cutting direction.

[Claim 13]

Method according to claim 12, wherein the at least one of the pulsed radiation beams is deflected by two-dimensional control signals for controllably deflecting the said pulsed radiation beam consecutively in orthogonal directions.

[Claim 14]

Cutting apparatus for cutting a wafer, the apparatus comprising:

a pulsed radiation source for providing a pulsed beam of radiation;

a splitting device for splitting a radiation beam into at least two radiation beams for performing two cutting actions of low power cutting of two trenches followed by a high power cutting of a fissure, wherein at least two of said cutting actions are performed simultaneously in one pass.

[Claim 15]

Cutting apparatus according to claim 14, wherein said splitting device comprise a main splitting device for splitting the beam into at least a first radiation beam for cutting at least one of the trenches and a second radiation beam for cutting the fissure.

[Claim 16]

Cutting apparatus according to claim 14 or 15, further comprising a first controllable beam deflection device for deflecting a radiation beam in either a first deflection angle ($\theta 1$) or a second deflection angle ($\theta 2$).

[Claim 17]

Cutting apparatus according to claim 16, further comprising a control device for controlling the first controllable beam deflection device, said control device being adapted to make the first controllable beam deflection device switch between said two deflection angles at a switching frequency (FS) equal to half the pulse repetition frequency (FP) of the pulsed radiation beam.

[Claim 18]

Cutting apparatus according to any of claims 15-17, further comprising a second controllable beam deflection device for deflecting the second radiation beam in a range between a first extreme deflection angle (θ1) and a second extreme deflection angle (θ2).

[Claim 19]

Cutting apparatus according to claim 18, further comprising a control device for controlling the second controllable beam deflection device, said control device being adapted to make the second controllable beam deflection device perform a scan between said two extreme deflection angles at a scanning frequency equal to the pulse repetition frequency (FP) of the pulsed radiation beam divided by an integer (N), wherein said integer (N) is equal to 2 or higher.

[Claim 20]

Cutting apparatus according to any of claims 15-19, wherein said main splitting device is adapted for splitting the beam in said first radiation beam for cutting a trench, said second radiation beam for cutting a fissure, and a third radiation beam for cutting a trench.

[Claim 21]

Cutting apparatus according to claim 20, adapted to operate in two operational modes for cutting in two different directions; wherein

- in a first operational mode, for cutting a fissure on the wafer in a first cutting direction, the third radiation beam is inactive and the first radiation beam is leading with respect to the second radiation beam; and
- in a second operational mode, for cutting a fissure on the wafer in a second cutting direction opposite the first cutting direction, the first radiation beam is inactive and the third radiation beam is leading with respect to the second radiation beam.

[Claim 22]

Cutting apparatus according to any of claims 15-19, wherein said main splitting device is adapted for splitting the beam in said first radiation beam for cutting trenches, said second radiation beam for cutting a fissure, and a third radiation beam for post-treatment to remove recast material that is formed during cutting of the fissure.

[Claim 23]

Cutting apparatus according to claim 22, wherein the third radiation beam is deflected in directions that are substantially transverse to a cutting direction along a cutting street.

[Claim 24]

Cutting apparatus according to any of claims 16-23, wherein the first controllable beam deflection device is configured to controllably deflect a radiation beam in either a direction that is substantially parallel to a cutting direction or a direction that is substantially transverse to a cutting direction.

[Claim 25]

Cutting apparatus according to claim 24, further comprising two-dimensional control signals that are provided to the first controllable beam deflection device for controllably deflecting the radiation beam consecutively in orthogonal directions.