Claims:

1. A method of singulating a semiconductor wafer by partitioning it along a network of scribelines, the wafer having two substantially parallel major surfaces that are separated from one another by a thickness $T < 200$ μm, said scribelines extending along a first of said major surfaces, characterized by the following steps:

- Adhering the second major surface of the wafer to an elastic foil, which is clamped to a wafer table so as to present the first major surface to a radiative scribing tool;
- Using the radiative scribing tool to produce at least one pulsed laser beam having a pulse duration $P \leq 75$ ps;
- Causing said laser beam to scan along each of said scribelines so as to create a radiative scribe with a depth $D < T$, thereby leaving the second major surface intact;
- Laterally stretching said foil so as to sever the second major surface along the path of said radiative scribes.

2. A method according to claim 1, wherein $P < C_{PP}$, in which C_{PP} is the Time Constant of phonon-phonon coupling in the wafer at the location of incidence of the laser beam.

3. A method according to claim 2, wherein $P < C_{EP}$, in which C_{EP} is the Time Constant of electron-phonon coupling in the wafer at the location of incidence of the laser beam.

4. A method according to any of the claims 1-3, wherein the difference $F = T-D$ lies in the range 5-50 μm; for example in the range 10-30 μm.

5. A method according to any of the claims 1-4, wherein:

- T lies in the range 20-200 μm; for example in the range 30-150 μm, more particularly in the range 40-100 μm;
- P lies in the range 0.1 - 55 ps; for example in the range 1-20 ps, more particularly in the range 5-15 ps.

6. A method according to any of the claims 1-5, wherein, for a given scribeline, said radiative scribe is created as a cumulative result of a plurality of process steps, each step entailing a single scan of the laser along said scribeline.

7. Apparatus constructed and arranged to perform a method as claimed in any of the claims 1-6.

CLAIMS

1. A method of singulating a semiconductor wafer by partitioning it along a network of scribelines, the wafer having two substantially parallel major surfaces that are separated from one another by a thickness $T<200$ μm, said scribelines extending along a first of said major surfaces, comprising:

adhering the second major surface of the wafer to an elastic foil, which is clamped to a wafer table so as to present the first major surface to a radiative scribing tool;

using the radiative scribing tool to produce at least one pulsed laser beam having a pulse duration $P\leq 75$ ps;

causing said laser beam to scan along each of said scribelines so as to create a radiative scribe with a depth $D<T$, thereby leaving the second major surface intact; and

laterally stretching said foil so as to sever the second major surface along the path of said radiative scribes.

2. A method according to claim 1, wherein $P < C_{PP}$, in which C_{PP} is the Time Constant of phonon-phonon coupling in the wafer at the location of incidence of the laser beam.

3. A method according to claim 2, wherein $P < C_{EP}$, in which C_{EP} is the Time Constant of electron-phonon coupling in the wafer at the location of incidence of the laser beam.

4. A method according to any one of the preceding claims, wherein the difference $F=T-D$ is in the range 5-50 μm.

5. A method according to claim 4, wherein the difference $F=T-D$ is in the range 10-30 μm.

6. A method according to any one of the preceding claims, wherein: T is in the range 20-200 μm and P is in the range 0.1-55 ps.

7. A method as in claim 6, wherein T is in the range 30-150 μm, and P is in the range 1-20 ps.

8. A method as in claim 7, wherein T is in the range 40-100 μm, and P is in the range 5-15 ps.

9. A method according to any one of the preceding claims, wherein, for a given scribeline, said radiative scribe is created as a cumulative result of a plurality of process steps, each step entailing a single scan of the laser along said scribeline.

10. A system for singulating a semiconductor wafer by partitioning it along a network of scribelines, the wafer having two substantially parallel major surfaces that are separated from one another by a thickness $T<200$ μm, said scribelines extending along a first of said major surfaces, the wafer being adhered to an elastic foil on a second of said major surfaces, comprising:

a radiative scribing tool including a laser configured and arranged to generate a pulsed laser beam having a pulse duration $P\leq 75$ ps;

a wafer table, constructed and arranged to hold the wafer such that the first major surface is exposed to the radiative scribing tool;

an actuator, configured and arranged to cause the laser beam to relatively scan along each of said scribelines so as to create a radiative scribe with a depth $D<T$, thereby leaving the second major surface intact; and

actuators constructed and arranged to laterally stretch said foil so as to sever the second major surface along the path of said radiative scribes.