CLAIMS:

1. An apparatus for irradiating semiconductor material comprising:

- a laser generating a primary laser beam;
- a means for shaping the primary laser beam, comprising a plurality of apertures for shaping the primary laser beam into a plurality of secondary laser beams; and
- an optical system adapted for superposing the secondary laser beams to irradiate a common region of a semiconductor substrate;

the shape and/or size of the individual apertures corresponding to the shape and/or size of said common region to be irradiated by the superposed secondary laser beams,
characterized in that one such aperture is an opening through which part of the primary laser beam passes or a higher transmittance area surrounded by a lower transmittance area.

2. The apparatus according to claim 1, wherein the shape and size of the apertures is such that the spot shape and spot size of the secondary laser beams match the shape and size of said region to be irradiated.

3. The apparatus according to claim 1 or 2, wherein the optical system comprises an array of microlenses of which each one of the microlenses corresponds to one of the plurality of apertures, and a spherical lens.

4. The apparatus according to claim 3, wherein the optical system additionally comprises a second array of microlenses of which each one of the microlenses corresponds to one of the plurality of apertures.

5. The apparatus according to anyone of claims 1 to 4, wherein the laser comprises an output mirror and wherein the plurality of apertures is located at the inner surface of the output mirror.

6. The apparatus according to claim 5, wherein the plurality of apertures comprises a partially reflective coating having a plurality of higher transmittance areas surrounded by a lower transmittance area.

7. The apparatus according to any of the above claims wherein the plurality of apertures is an M x N array of apertures.

8. The apparatus according to any of the above claims wherein at least one of the apertures shows a pattern.

9. The apparatus according to any of the above claims, wherein the laser is an excimer laser adapted to produce a projected laser beam with an energy density between 0.5 and 10 J/cm^2.

10. The apparatus according to any of the above claims, wherein the region to be irradiated corresponds to at least one full die.

11. The apparatus according to any of the above claims, further comprising means for aligning the secondary beam spot in XYZ-direction with the region to be irradiated.

12. Use of an apparatus according to any of the above claims in semiconductor device manufacturing.