scanning in a first sub scanning direction. The second laser beam scanning system has a third movable mirror for deflecting a laser beam in a second main scanning direction and a long fourth movable mirror for receiving the laser beam deflected in the second main scanning direction and conducting scanning in a second sub scanning direction. The second movable mirror has means for scanning a laser beam in the first sub scanning direction at a rotation angle about the axis of the long shape direction as a center to irradiate the laser beam to an object to be processed which is placed on a stage. The fourth movable mirror has means for scanning a laser beam in the second sub scanning direction at a rotation angle about the axis of the long shape direction as a center to irradiate the laser beam to the object to be processed which is placed on the stage.

[**0102**] In the above configuration, a galvanomirror or a polygon mirror is applied to the first and second movable mirrors. A solid laser or a gas laser is preferably applied to a laser for providing the laser beam.

[**0103**] In the above configuration, a laser beam is scanned in the main scanning direction by the first movable mirror and scanned in the sub scanning direction by the second movable mirror. Thus, the laser beam can be irradiated in an arbitrary position onto the object to be processed. In addition, a plurality of such laser beam scanning means are provided and laser beams are irradiated to a surface to be formed in biaxial directions. Thus, a laser processing time can be shortened.

[**0104**] Hereinafter, a laser irradiation apparatus of this embodiment will be described with reference to the drawings.

[**0105**] **FIG. 3** shows a desirable example of a laser processing apparatus of this embodiment. The shown laser processing apparatus includes a solid laser **101** capable of conducting continuous oscillation or pulse oscillation, a lens such **102** as a collimator lens or a cylindrical lens for condensing a laser beam, a fixed mirror **103** for changing an optical path of the laser beam, a galvanomirror **104** for radially scanning the laser beam in a two-dimensional direction, and a movable mirror **105** for receiving the laser beam by the galvanomirror **104** and irradiating the laser beam toward a surface to be irradiated of a stage **106**. An optical axis of the galvanomirror **104** and that of the movable mirror **105** are intersected each other and rotated in arrow directions shown in **FIG. 3**, respectively. Thus, a laser beam can be scanned over the entire surface of a substrate **107** placed on the stage **106**. When the movable mirror **105** is used as an fθ mirror to correct an optical path difference, a beam shape on a surface to be irradiated can be also adjusted.

[**0106**] **FIG. 3** shows a system for scanning a laser beam in a uniaxial direction of the substrate **107** placed on the stage **106** by the galvanomirror **104** and the movable mirror **105**. As a more preferable configuration, as shown in **FIG. 4, a** half mirror **108**, a fixed mirror **109**, a galvanomirror **110**, and a movable mirror **111** is added to the configuration shown in **FIG. 3**, and laser beams may be simultaneously scanned in biaxial directions (X- and Y- directions). A processing time can be shortened by using such a configuration. Note that the galvanomirrors **104** and **110** may be replaced by polygon mirrors.

[**0107**] A solid laser is preferable as the laser, and a solid laser using crystal such as YAG, YVO_4, YLF, or YAl_5O_{12} which is doped with Nd, Tm, or Ho, or a semiconductor laser is preferably used. A fundamental wave of an oscillation wavelength is changed dependent on a doping material. An oscillation is produced at a wavelength of 1 μm to 2 μm. When a non-single crystalline semiconductor film is crystallized, in order to selectively absorb a laser beam by the semiconductor film, it is preferable that the second harmonic to the fourth harmonic of the oscillation wavelength is applied. Typically, in the case of crystallization of amorphous silicon, the second harmonic (532 nm) of an Nd: YAG laser (fundamental wave: 1064 nm) is used.

[**0108**] In addition, a gas laser such an argon laser, a krypton laser, or an excimer laser can be applied.

[**0109**] Also, an atmosphere at laser light irradiation may be an atmosphere containing oxygen, an atmosphere containing nitrogen, an inert atmosphere, or a vacuum and is preferably selected as appropriate according to a purpose.

[**0110**] An oscillation mode may be either pulse oscillation or continuous oscillation. In order to achieve continuous crystal growth with a molten state of the semiconductor film, it is desirable that a continuous oscillation mode is selected.

[**0111**] In the case where a TFT which is made from a semiconductor film crystallized by laser annealing is formed on a substrate, when a crystal growth direction is aligned with a carrier moving direction, high field effect mobility can be obtained. In other words, when the crystal growth direction is aligned with the channel length direction, the field effect mobility can be substantially increased.

[**0112**] When a continuous oscillating laser beam is irradiated to a non-single crystalline semiconductor film for crystallization, a solid-liquid interface is kept. Thus, a continuous crystal growth can be obtained in the scanning direction of the laser beam. As shown in **FIG. 4**, with respect to a TFT substrate (substrate to which TFTs are mainly formed) **112** used for manufacturing an active matrix liquid crystal display device which driver circuits are integrally formed, driver circuit portions **114** and **115** are provided in the vicinity of a pixel portion **113**. **FIG. 4** shows a configuration of a laser irradiation apparatus made in consideration of such a layout. As described above, in the case of the configuration in which laser beams are incident from the biaxial directions, laser beams can be synchronously or asynchronously irradiated in an X-direction and a Y-direction indicated by arrows in the drawing by a combination of the galvanomirrors **104** and **110** and the movable mirrors **105** and **111**. In addition, it is possible that a location is designated according to the layout of TFTs and a laser beam is irradiated thereto.

[**0113**] **FIG. 5** shows a relationship between the substrate **112** to which TFTs are provided and an irradiation direction of a laser beam in detail. Regions in which the pixel portion **113** and the driver circuits **114** and **115** are formed are indicated by dot lines on the substrate **112**. In a stage of crystallization, a non-single crystalline semiconductor film is formed on the entire surface. Semiconductor regions for forming TFTs can be designated by alignment makers or the like formed in end portions of the substrate.

[**0114**] For example, the driver circuit portion **114** is a region for forming a scan line driver circuit. In its partially enlarged view **301**, semiconductor regions **204** of TFTs and a scanning direction of a laser beam **201** are indicated. The