REFERENCE NUMERALS

11: wiring; 12: wiring; 13: wiring; 14: wiring; 15: wiring; 21: input terminal; 22: input terminal; 23: input terminal; 24: input terminal; 25: input terminal; 26: output terminal; 27: output terminal; 31: transistor; 32: transistor; 33: transistor; 34: transistor; 35: transistor; 36: transistor; 37: transistor; 38: transistor; 39: transistor; 40: transistor; 41: transistor; 42: transistor; 43: transistor; 51: power supply line, 52: power supply line, 53: power supply line, 61: period; 62: period; 100: substrate; 101: gate electrode layer; 102: gate insulating layer; 103: oxide semiconductor layer; 105a: drain electrode layer; 105b: drain electrode layer; 107: oxide insulating layer; 108: capacitor wiring; 110: pixel electrode layer; 121: terminal; 122: terminal; 125: contact hole; 126: contact hole; 127: contact hole; 128: transparent conductive layer; 129: transparent conductive layer; 132: conductive layer; 133: oxide semiconductor layer; 134: oxide semiconductor layer; 150: terminal; 151: terminal; 152: gate insulating layer; 153: connection electrode layer; 154: oxide insulating layer; 155: transparent conductive layer; 156: electrode layer; 170: thin film transistor; 400: substrate; 401: gate electrode layer; 402: gate insulating layer; 403: oxide semiconductor layer; 404a: source region or drain region; 404b: source region or drain region; 405a: source electrode layer or drain electrode layer; 405b: source electrode layer or drain electrode layer; 407: oxide insulating layer; 408: conductive layer; 409: conductive layer; 410: insulating layer; 411: pixel electrode layer; 419: conductive layer; 430: oxide semiconductor layer; 431: oxide semiconductor layer; 441: oxide semiconductor layer; 450: substrate; 451: gate electrode layer; 452: gate electrode layer; 453: oxide semiconductor layer; 455a: source electrode layer or drain electrode layer; 455b: source electrode layer or drain electrode layer; 457: oxide insulating layer; 460: thin film transistor; 470: thin film transistor; 471: thin film transistor; 472: thin film transistor; 473: thin film transistor; 483: oxide semiconductor layer; 580: substrate; 581: thin film transistor; 583: insulating layer; 585: insulating layer; 587: electrode layer; 588: electrode layer; 589: spherical particle; 590a: black region; 590b: white region; 594: cavity; 595: filler; 596: substrate; 601:electric furnace; 602: chamber; 603: heater; 604: substrate; 605: susceptor; 606: gas supply means; 607: evacuation means; 611: gas supply source; 612: pressure adjusting valve; 613: refiner; 614: mass flow controller; 615: stop valve; 701: oxide semiconductor layer; 703: layer; 705: layer; 707: solid line; 709: broken line; 711: oxide semiconductor layer; 713: oxygen; 715: oxide semiconductor layer; 1400: substrate; 1401: gate electrode layer; 1402: gate insulating layer; 1403: oxide semiconductor layer; 1405a: source electrode layer; 1405b: drain electrode layer; 1406a: source region; 1406b: drain region; 1407: insulating layer; 1408: insulating layer; 1409: conductive layer; 1418: channel protective layer; 1430: thin film transistor; 1431: thin film transistor; 1432: thin film transistor; 1470: thin film transistor; 2600: TFT substrate; 2601: counter substrate; 2602: sealant; 2603: pixel portion; 2604: display element; 2605: coloring layer; 2606: polarizing plate; 2607: polarizing plate; 2608: wiring circuit portion; 2609: flexible wiring board; 2610: cold cathode tube; 2611: reflective plate; 2612: circuit board; 2613: diffusion plate; 2700: e-book reader; 2701: housing; 2703: housing; 2705: display portion;

2707: display portion; 2711: hinge; 2721: power source; 2723: operation key; 2725: speaker; 4001: substrate; 4002: pixel portion; 4003: signal line driver circuit; 4004: scan line driver circuit: 4005: sealant; 4006: substrate; 4008: liquid crystal layer; 4010: thin film transistor; 4011: thin film transistor; 4013: liquid crystal element; 4015: connection terminal electrode; 4016: terminal electrode; 4018: FPC; 4019: anisotropic conductive layer; 4020: protection insulating layer; 4021: insulating layer; 4030: pixel electrode layer; 4031: counter electrode layer; 4032: insulating layer; 4501: substrate; 4502: pixel portion; 4503a: signal line driver circuit; 4504a: scan line driver circuit; 4518a: FPC; 4505: sealant; 4506: substrate; 4507: filler; 4509: thin film transistor; 4510: thin film transistor; 4511: light-emitting element; 4512: electroluminescence layer 4513: electrode layer; 4515: connection terminal electrode; 4516: terminal electrode; 4517: electrode layer; 4519: anisotropic conductive layer; 4520: partition; 4544: insulating layer; 4543: protection insulating layer; 5300: substrate; 5301: pixel portion; 5302: scan line driver circuit: 5303: scan line driver circuit; 5304: signal line driver circuit; 5305: timing control circuit; 5601: shift register; 5602: switching circuit; 5603: thin film transistor; 5604: wiring; 5605: wiring; 6400: pixel; 6401: switching transistor; 6402: driving transistor; 6403: capacitor; 6404: capacitor; 6405: signal line; 6406: scan line; 6407: power supply line; 6408: common electrode; 7001: TFT; 7002: light-emitting element; 7003: cathode; 7004: light-emitting layer; 7005: anode; 7009: cathode; 7011: driving TFT; 7012: light-emitting element; 7013: cathode; 7014: light-emitting layer; 7015: anode; 7016: blocking layer; 7017: conductive layer; 7019: partition; 7021: driving TFT; 7022: light-emitting element; 7023: cathode; 7024: light-emitting layer; 7025: anode; 7027: conductive layer; 7029: partition; 9201: display portion; 9202: display button; 9203: operation switch; 9205: adjusting portion; 9206: speaker; 9208: microphone; 9301: top housing; 9302: bottom housing; 9303: display portion; 9304: keyboard; 9305: external connection port; 9306: pointing device; 9307: display portion; 9600: television set; 9601: housing; 9603: display portion; 9605: stand; 9607: display portion; 9609: operation key; 9610: remote controller; 9700: digital photo frame; 9701: housing; 9703: display portion; 9881: housing; 9882: display portion; 9883: display portion; 9884: speaker portion; 9885: operation key; 9886: recording medium insertion portion; 9887: connection terminal, 9888: sensor; 9889: microphone; 9890: LED lamp; 9891: housing; 9893: connection portion; 9900: slot machine; 9901: housing; 9903: display portion

CLAIMS

1. A method for manufacturing a semiconductor device, comprising:

forming a gate electrode layer over a substrate having an insulating surface;

forming a gate insulating layer over the gate electrode layer;

forming an oxide semiconductor layer over the gate insulating layer;

heating the oxide semiconductor layer in an oxygen atmosphere;

forming a source and drain electrode layers over the oxide semiconductor layer;

forming an oxide insulating layer which is in contact with part of the oxide semiconductor layer, over the gate insulating layer, the oxide semiconductor layer, and the source and drain electrode layers; and

performing a heat treatment in an oxygen atmosphere or an inert gas atmosphere.

2. A method for manufacturing a semiconductor device, comprising:

forming a gate electrode layer over a substrate having an insulating surface;

forming a gate insulating layer over the gate electrode layer;

forming an oxide semiconductor layer over the gate insulating layer;

heating the oxide semiconductor layer in an oxygen atmosphere, so that the oxide semiconductor layer is dehydrated or dehydrogenated;

forming a source and drain electrode layers over the oxide semiconductor layer;

forming an oxide insulating layer which is in contact with part of the oxide semiconductor layer, over the gate insulating layer, the oxide semiconductor layer, and the source and drain electrode layers; and

performing a heat treatment in an oxygen atmosphere or an inert gas atmosphere.

3. A method for manufacturing a semiconductor device, comprising:

forming an oxide semiconductor layer over an insulating layer;

heating the oxide semiconductor layer in an oxygen atmosphere;

forming a source and drain electrode layers over the oxide semiconductor layer;

forming an oxide insulating layer which is in contact with part of the oxide semiconductor layer, over the insulating layer, the oxide semiconductor layer, and the source and drain electrode layers; and

performing a heat treatment in an oxygen atmosphere or an inert gas atmosphere.

4. A method for manufacturing a semiconductor device, comprising:

forming an oxide semiconductor layer over an insulating layer;

heating the oxide semiconductor layer in an oxygen atmosphere, so that the oxide semiconductor layer is dehydrated or dehydrogenated;

forming a source and drain electrode layers over the oxide semiconductor layer;

forming an oxide insulating layer which is in contact with part of the oxide semiconductor layer, over the insulating layer, the oxide semiconductor layer, and the source and drain electrode layers; and

performing a heat treatment in an oxygen atmosphere or an inert gas atmosphere.

5. The method for manufacturing a semiconductor device according to any one of claims 1 to 4, wherein a temperature at which the oxide semiconductor layer is heated in the oxygen atmosphere is higher than or equal to 200 °C and lower than a strain point of the substrate.

6. The method for manufacturing a semiconductor device according to any one of claims 1 to 4, wherein after the oxide semiconductor layer is heated in the oxygen atmosphere, the oxide semiconductor layer is held in the oxygen atmosphere.

7. The method for manufacturing a semiconductor device according to any one of claims 1 to 4, wherein after the oxide semiconductor layer is heated in the oxygen

atmosphere, the oxide semiconductor layer is held in an inert gas atmosphere.