CLAIMS:

1. A heat-treatment furnace for use in the heat treatment of semiconductor substrates, comprising a cylindrical core tube which is provided at opposite ends with openings having a sufficient size to allow a boat having semiconductor substrates rested thereon on standby to be moved into and out of the core tube, a heater for heating the core tube, lids each of which is detachably mounted to the core tube to block the opening to substantially seal the core tube, a first thin gas inlet conduit disposed near the longitudinal center of the core tube for introducing a high-purity gas into the core tube to keep the furnace interior clean during movement of the boat into and out of the core tube, and a second thin gas inlet conduit penetrating through the one of the lids for introducing a process gas into the core tube for heat-treatment during the heat-treatment of the semiconductor substrates,

wherein during continuous implementation of batch heat-treatment which comprises moving a boat having semiconductor substrates into the core tube, performing the heat-treatment of the substrates and moving the boat having the substrates out of the core tube, the operation of moving a first boat having heat-treated semiconductor substrates out of the one of the openings of the core tube and the operation of moving a second boat having next semiconductor substrates into the other of the openings of the core tube are performed at the same time while introducing the high-purity gas into the core tube from the first thin gas inlet conduit to keep the furnace interior clean.

~~2. The heat treatment furnace of claim 1, further comprising lids each of which is detachably mounted to the~~

~~core tube to block the opening to substantially seal the core tube.~~

~~3. The heat-treatment furnace of claim 1 or 2, further comprising thin gas inlet conduits penetrating through the lids for introducing gas into the core tube.~~

~~4. The heat-treatment furnace of any one of claims 1 to 3, further comprising thin gas inlet conduits disposed near opposite ends of the core tube for introducing gas into the core tube.~~

~~5. The heat-treatment furnace of any one of claims 1 to 4, further comprising a thin gas inlet conduit disposed near the longitudinal center of the core tube for introducing gas into the core tube.~~

2. The heat-treatment furnace of claim 1, wherein the operation of moving the first boat having heat-treated semiconductor substrates out of the core tube comprises opening the one of the lids, moving the first boat out of the one of the openings of the core tube and closing the one of the lids, and the operation of moving the second boat having next semiconductor substrates into the core tube comprises opening the other of the lids, moving the second boat into the other of the openings of the core tube and closing the other of the lids.

3. The heat-treatment furnace of claim 1, wherein during movement of the first and second boats into and out of the core tube, the first thin gas inlet conduit is opened and the second thin gas inlet conduit is closed, and during the heat-treatment of the semiconductor substrates, the first thin gas

inlet conduit is closed and the second thin gas inlet conduit is opened.

~~64~~4. The heat-treatment furnace of ~~any one of claims 1 to 5~~ claim 1, wherein the opening in the core tube has an inner diameter which is at least 95% of the inner diameter of the core tube at the center.

~~7~~5. The heat-treatment furnace of ~~any one of claims 1 to 6~~ claim 1, further comprising at least one boat station disposed outside the core tube and in proximity to the opening in the core tube, the boat station carrying ~~a~~ the boat having semiconductor substrates rested thereon on standby.

6. A method for a heat-treatment of semiconductor substrates using the heat-treatment furnace of claim 1, the method comprising a step of movement of the boat into and out of the core tube, wherein the operation of moving the first boat having heat-treated semiconductor substrates out of the one of the openings of the core tube and the operation of moving the second boat having next semiconductor substrates into the other of the openings of the core tube are performed at the same time while introducing the high-purity gas into the core tube from the first thin gas inlet conduit to keep the furnace interior clean, and a step of heating the semiconductor substrates in the core tube while introducing the process gas into the core tube from the second thin gas inlet conduit for the heat-treatment of the semiconductor substrates.

~~8~~7. The ~~heat treatment furnace~~ method of ~~any one of claims 1 to 7~~ claim 6, wherein the heat treatment is intended to diffuse a p- or n-type dopant into silicon substrates.

~~9~~8. The ~~heat treatment furnace~~ method of ~~any one of claims 1 to 7~~ claim 6, wherein the heat treatment is intended to oxidize silicon substrates.