

Microcrystalline Silicon Film Forming Method and Solar Cell

ABSTRACT

This invention provides a PCVD process, which can form microcrystalline silicon using hydrogen gas at a low flow rate, and provides a microcrystalline silicon solar cell at lower cost. The method for microcrystalline silicon formation by the PCVD process is characterized by comprising arraying a plurality of antennas, both ends of which are connected respectively to a high-frequency power supply and a ground, within one plane in a vacuum chamber to constitute an array antenna structure, disposing the substrate so as to face the array antenna, raising the temperature of the substrate to 150 to 250°C, introducing a mixed gas containing hydrogen gas and silane gas into the system, supplying a high-frequency electric power to the plurality of antenna to generate plasma, and regulating the hydrogen gas/silane gas flow rate ratio in the range of 1 to 10 to form, on the substrate, such a microcrystalline silicon film that the ratio between a crystalline silicon-derived Raman scattering intensity at a wavenumber around 520 cm^{-1} , I_c , and a noncrystalline silicon-derived Raman scattering intensity at a wavenumber around 480 cm^{-1} , I_a , i.e., I_c/I_a , is 2 to 6.

Figure 1