

Silicon Solar Cells

Junsin Yi

School of Information and Communication Engineerin, Sungkyunkwan University 300- ChunChun-dong,
Jangan-gu, Kyounggy-do, Suwon-city, 440-746, South Korea

PV technology permits the transformation of solar light directly into electricity. For the last five years, the photovoltaic sector has experienced one of the highest growth rates worldwide (over 30% in 2006) and for the 20 next years, the average production growth rate is estimated to be between 27% and 34% annually. Currently the cost of electricity produced using photovoltaic technology is above that for traditional energy sources, but this is expected to fall with technological progress and more efficient production processes. A large scale production of solar grade silicon material of high purity could supply the world demand at a reasonably lower cost. A shift from crystalline silicon to thin film is expected in the future. The technical limit for the conversion efficiency is about 30%. It is assumed that in 2030 thin films will have a major market share (90%) and the share of crystalline cells will have decreased to 10%. Our research at Sungkyunkwan University of South Korea is confined to crystalline silicon solar cell technology. We aim to develop a technology for low cost production of high efficiency silicon solar cell. We have successfully fabricated silicon solar cells of efficiency more than 16% starting with multicrystalline wafers and that of efficiency more than 17% on single crystalline wafers with screen printing metallization. The process of transformation from the first generation to second generation solar cell should be geared up with the entry of new approaches but still silicon seems to remain as the major material for solar cells for many years to come. Local barriers to the implementation of this technology may also keep continued up to year 2010 and by that time the cost of the solar cell generated power is expected to be 60 cent per watt. Photovoltaic source could establish itself as a clean and sustainable energy alternate to the ever depleting and polluting non-renewable energy resource.

Key words: Photovoltaic, Solar Cell, Crystalline, Silicon, Energy