C4-O-010406

REDUCE THE SURFACE RESISTANCE OF SILICON SURFACE BY A TRANSPARENT CONDUCTIVE COATING BASED ON TIN OXIDE

Z.S. KAZHIYEV, D.O. MURZALINOV

Al-Farabi Kazakh National University, Almaty, Kazakhstan

Texturing silicon solar cells helps improve their light absorption and reduces reflection. By texturing solar cells, the path length of light through the cells is increased and the light is trapped more efficiently.

The purpose of this work was to determine the modes of applying a tin oxide coating on the textured surface of silicon wafers to reduce the surface resistance of the sample.

The initial substrate had different surface defects, which is associated with different treatment times in acids during texturization and etching. Samples: A-56 – an untextured silicon, T-46 – with uneven distribution of pyramids, T-30 –with uniform distribution of pyramids on the surface.

Coating with 5 layers of SnO_2, the dangling bonds of A-56 sample react with particles of the film-forming system and lose their activity (Fig. 1). At the same time, the resistance drops. Further increasing the number of layers also reduces the number of dangling bonds and surface resistance.

As a result of increased defectiveness in T-46 coated with 5 layers of SnO2 leads to an increase in resistance. 10 coats were applied, which results in a reduction of resistance. When 15 layers applied the wafer surface is completely passivated, and then, at 20 layers the resistance does not change significantly. A similar picture occurs for T-30 sample. 15 layers of tin oxide is enough to completely passivate the silicon wafers surface

Comparing the graphs, it is noticeable when 5 layers are coated, the greatest increase in resistance occurs for T-30 sample. Due to the processing time of wafers etching and texturization in acids is the longest. Therefore, the most effective removal of the damaged layer formed when cutting the wafers.

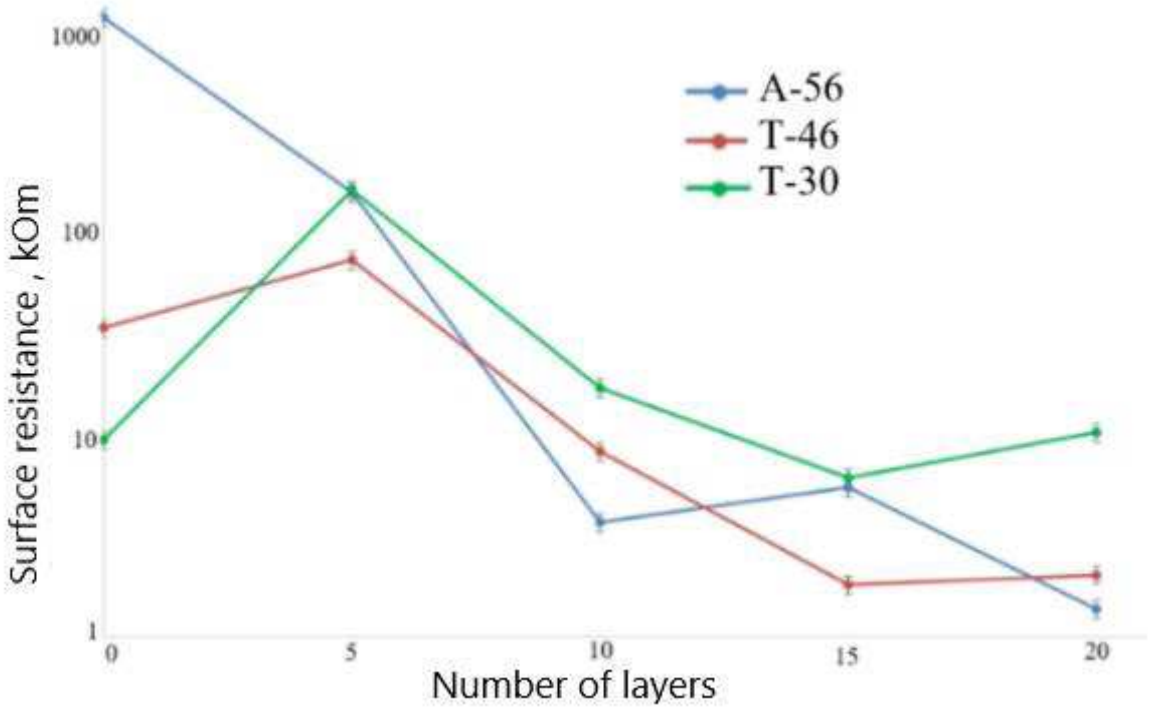

Fig.1. Dependence of resistivity on the number of applied coating layers.

Thus, the deposition of 15 layers is a critical point in the measurement of optical parameters, specific surface area, and resistivity for the samples under study.

REFERENCES

[1] Matthias Batzill, Ulrike Diebold 2005 The surface and materials science of tin oxide// Progress in Surface Science. 2005.V.79. P.49-53

[2] Mukhamedshina D.M., Mit' K.A., Beisenkhanov N.B., Dmitriyeva E.A., Valitova I.V. Influence of plasma treatments on the microstructure and electrophysical properties of SnOx thin films synthesized by magnetron sputtering and sol-gel technique //Journal of Materials Science-Materials in Electronics. 2008. V.19. P. S382-S387.