

EXERCISE SERIES 12

Exercise 1: Laser doped solar cells

Read the article *S.J. Eisele et al., 18.9% efficient full area laser doped silicon solar cell, Appl. Phys. Lett. 95, 133501, 2009*

- a) What are the advantages of laser doping (LD)?
- b) What was the main drawback of this method and what is the main claim of improvement shown by this article?
- c) Describe the whole process for the fabrication of the p-n junction presented in this paper.
- d) Do they passivate the wafer of their record cell made with LD? If yes, how and why?
- e) Do they use an antireflection coating on their record cell made with LD? If yes, which kind?
- f) How do they create the back metallic contacts of their record cell made with LD?
- g) Compare the three cells (A,B,C) presented in this paper and comment on their differences regarding their performances.
- h) How do they verify the potential of their approach?
- i) In Fig. 3, why does J_{0e} increase when the sheet resistance decreases?
- j) Do they use a selective (here, means locally doped) emitter ? Do they discuss the area of metallized fraction?
- k) Give all the steps to process such a solar cell.