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THE TREATMENT OF METALLURGICAL GRADE SILICON, FOR THE PRODUCTION OF SOLAR ENERGY IN BRAZIL

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The silicon is being the subject of interest and study for the world. Faced with the great need to replace energies based on fossil fuel for cleaner and renewable energies and the need to reduce CO₂ emissions, the Si has become an element of great importance, since it is the base of clean and renewable energy and high-tech's production.

The growth in demand for SiSG is increasing due to the need to develop a silicon metal dedicated to the solar photovoltaic industry and independent of the SiEG manufacturing industry. There are two possible routes of production to obtain this silicon. The first is the acquisition of the SiEG, called the chemical route, which has been the subject of research for having an extremely costly process, making it a selective and difficult production. The second comes from the metallurgical route, which allows obtaining the SiSG at a lower cost, from the purification of metallurgical grade silicon, which has a higher level of impurities (99-99.5%) [1]. In Brazil, the production of SiSG through the metallurgical route has much more technical than economic challenge, since the operations involved in the production of silicon by this route, such as fusion, controlled solidification, pyro refining and hydrometallurgical, are much closer than it is dominated by the Brazilian industries producers of SiMG, favoring their adaptation [1].

The photovoltaic solar energy market, that is developed basing the SiSG, has grown at rates above 40% per year in the last 10 years, and in 2009 the growth was 52%. Even with great growth, photovoltaic solar energy still has a high cost if compared to the various energy productions used. However, this cost has falling gradually in the last years, and the expectation is that it will have competitive costs with traditional sources of energy by 2020/2030 [2]. In 2009, the consumption of silicon in the solar photovoltaic industry exceeded 100.000 t, and the speculation and consumer growth surveys for SiSG indicate more than 200.000 t of consumption by 2020, representing a market of approximately US\$ 5 billion [3].

Conclusion. In Brazil the Si reserves among the largest and best in the world, being a great competitive advantage for the country. As a complement, it is still among the world's largest producers id SiEG, with a production capacity of approximately 200 thousand t/ year.

References

1. "A rota metalúrgica de produção de silício grau solar: uma oportunidade para a indústria brasileira?" [Electronic resource]: BNDES [Site]: URL: <https://web.bndes.gov.br/bib/>
2. A rota metalúrgica do silício: da extração do quartzo à obtenção do silício de grau fotovoltaico [Electronic resource]: Federal University of Santa Catarina [Site]: URL: https://repositorio.ufsc.br/bitstream/handle/123456789/188037/TCC_MARCELOCRISTIANOLUDK_E_FINAL.pdf?sequence=1 (accessed 01.04.2019).
3. Solar energy generation in Brazil shoots to take advantage of rules [Electronic resource]: Correio Braziliense – Economy [Site]: URL: https://www.correiobraziliense.com.br/app/noticia/economia/2018/11/26/internas_economia,721472/geracao-solar-dispara-para-aproveitar-regras.shtml (accessed 01.04.2019).