Growth of mc-Silicon ingot by DS Process: Computational Modeling and Experimental validation

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The heat and mass transport phenomena of the standard and variously modified India-made DS system's mc-Silicon growing process are reported in this work. The DS process has benefited from the development of new process technologies within the DS process domain to create high quality Si wafers that have demonstrated notable increases in photovoltaic efficiency, making it an appealing option. These advancements in the DS process have been made possible through the use of theoretical modelling and simulation. Numerical simulation is now a useful and crucial tool for field prediction, parameter management, and design optimization of a Si crystal growth system in order to enhance crystal quality. This is due to modern computer and computing technology's rising processing power. Numerical simulation studies utilising CGSim software are being conducted in order to clarify the heat and mass transport mechanisms as well as to establish strategies for managing the form of the melt-crystal interface and the thermal field in the locally developed furnace. When modelling the DS technique of crystal formation, different dimensionless numbers are taken into account, including the Marangoni number, Rayleigh number, Peclet number, Prandtl number, Reynolds number, and Schmidt number.