liquid, which is usually part of the remolten purified product or the feed liquid. This process happens because of the flowing of pure liquid and will be accomplished in several seconds. If the washing liquid keeps existing around the crystals, the liquid–liquid diffusion process from the pores of the crystals to the washing liquid would happen. Normally, the diffusion washing step takes more than 11 minutes. To prevent the washing liquid from crystallizing onto the crystals, it has to be superheated. Therefore, the diffusion washing is usually accompanied by a sweating process, which further promotes its purification effect. Considering the widely used washing columns in the melting crystallization industrial processes, its separation efficiency is obvious.

The parameters which need to be considered include the purity, temperature, amount, and the flow regime of the washing liquid. The purification of product is achieved through the contamination of the washing liquid which usually is part of the recycled purified product. In most cases, the contaminated liquid needs to be purified again. Compared to the crystallization process, a washing step needs much less operation time (11–20 minutes) and causes less energy consumption (just pumps and temperature control are needed).

As for the industrial melt crystallization, the selection of post-crystallization step (sweating or washing) depends on the properties of different systems and varies from case to case. Sweating is easy to operate and needs no additional equipment. However, we must make sure that the crystal layer will not slip off the cooled surface when partially molten. Washing is more efficient, but needs additional equipment and usually proceeds in a column, which means additional capital costs. Besides, accurate temperature control is necessary during washing processes to avoid too much remelting or crystallizing of the washing liquid.

11.4 Continuous Melt Crystallization

Compared to solution crystallization, melt crystallization is more difficult to realize in continuous operation mode due to the high concentration and high magma density of the system. Depending on the place where crystallization happens, melt crystallization processes can be divided into suspension crystallization and solid layer crystallization.[2,27–29] In suspension crystallization, crystals are suspended in the melt. For suspension crystallization, MSMPR (mixed suspension mixed product removal) crystallizers as well as their variations can be used in continuous mode. In solid layer crystallization, crystals nucleate and grow on a cooled surface. For commonly used solid layer crystallizers, such as MWB (Sulzer Metallwerk Buchs) and FFMC (falling film melt crystallization), pure products are harvested by melting the crystal layer. Therefore, it is difficult to operate them continuously. Nowadays, crystallizers with moving cooling surface have been developed to fulfill the