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Extrusion coating is one of the most promising techniques for micro- and nano-pattern replication in polymers [1]. The process of polymer extrusion is well established and has all the necessary heavy machinery already in place. This technique can easily be modified for pattern replication by introducing molds. Pattern replication is proven stable at speeds of 60 m/min and the process allows scaling up to 1000 m/min. [1,2]

Empirical data suggests different replication behavior depending on the structure size. Nano-sized patterns replicate best at the high speeds, however the micro sized shapes follow an opposite trend. It is important to fully understand this process and to find theoretical evidence that can predict the replication fidelity. In order to understand the process, a model is build up in Matlab, based on methods described in prof. Taylor's work [3].

The presented simulation technique opens up a possibility for predicting the replication fidelity of any repetitive pattern. This can allow improvement of replication designs for the commercial purpose, as well as the scientific advancement.

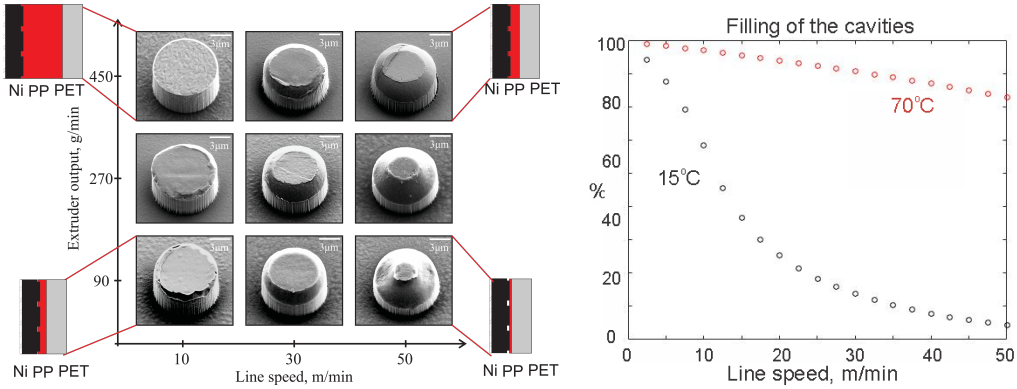

Figure 1: Standard micro-sized pillars replicated using extrusion coating. To the left, the actual data is presented with similar pillars replicated at different speeds at 70°C [2]. To the right, simulated data for different speeds at 15 and 70°C.

References

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