The scale-up of microwave-assisted processes

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The use of microwave energy as a tool for chemistry has received increasing attention during the last 10 years or so; nowadays, more and more researchers are applying the microwave technology to a wide range of reactions. Many examples have demonstrated that this technique can be adapted to most transformations with increased reaction rate, increased selectivity and sometimes with increased economics. The very nature of heating through the direct involvement of the raw material under processing and also technique's controllability, have a positive impact on the quality consistency as well as, when properly used, have a positive environmental impact.

However, there are still major challenges in the understanding of microwave-assisted processes: reproducible data and reliable methods for transferring the energy into the sample at a sufficient rate to obtain high energy densities, the lack of experimental approach for energy calculation and appropriate in situ dielectric properties measurement techniques.

It is of major importance to understand the functionality of the microwave assisted reactors that are expected to play an important role in the future industrial processing. The construction and dimensional control that these reactors allow are critical for understanding the optimized conditions for scaling up processes while maintaining higher performance and lower costs than conventional methods.