

Effect of microwave heating on the sol-gel process of silica gels



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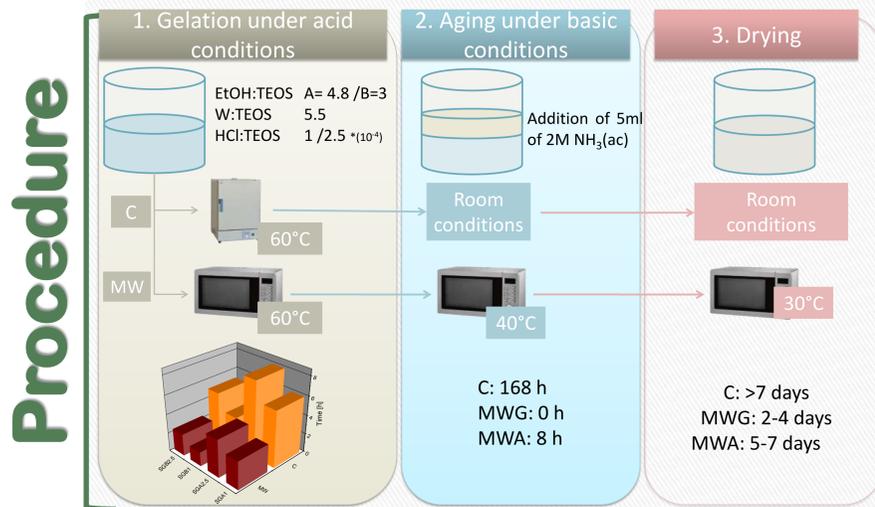
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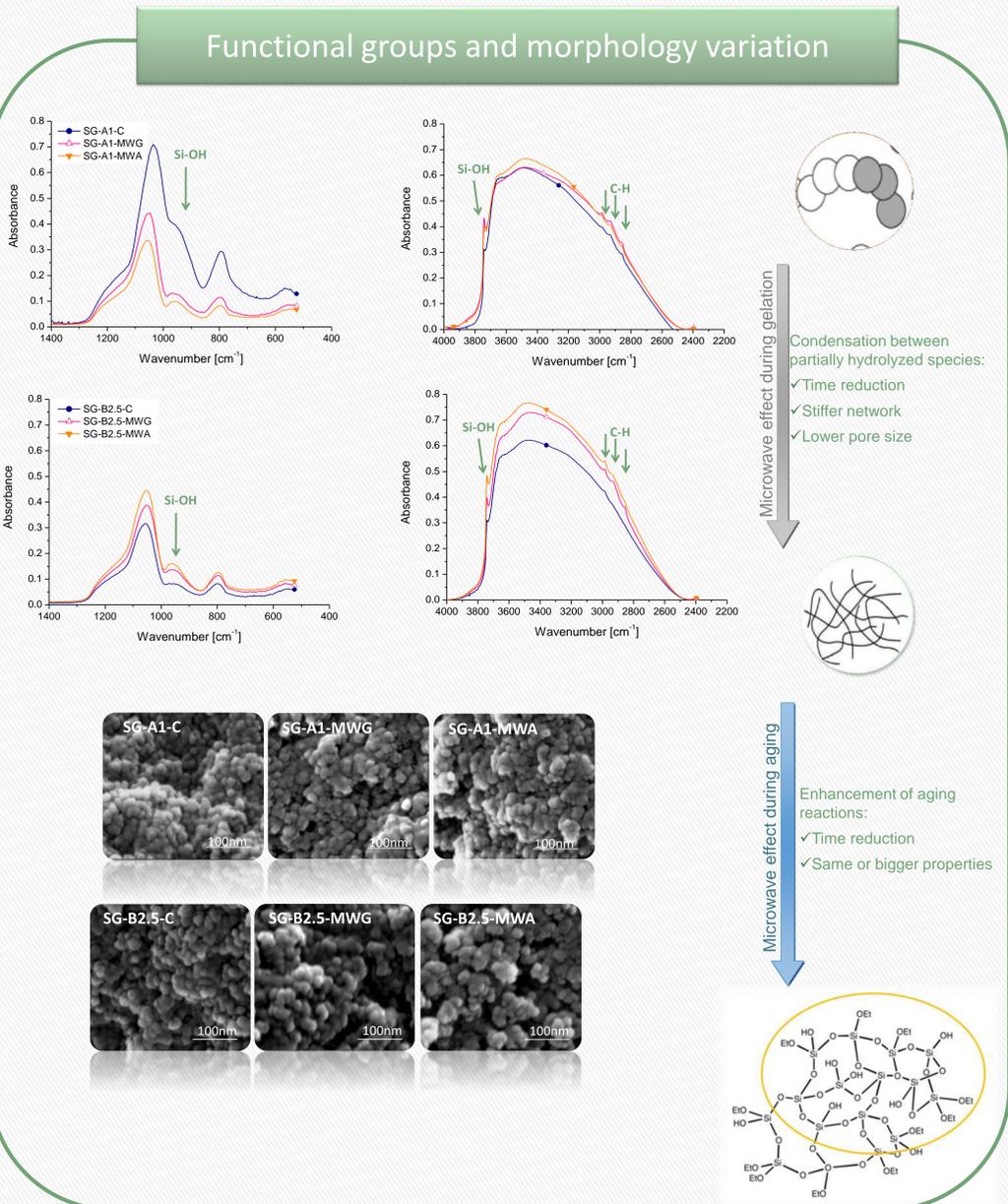
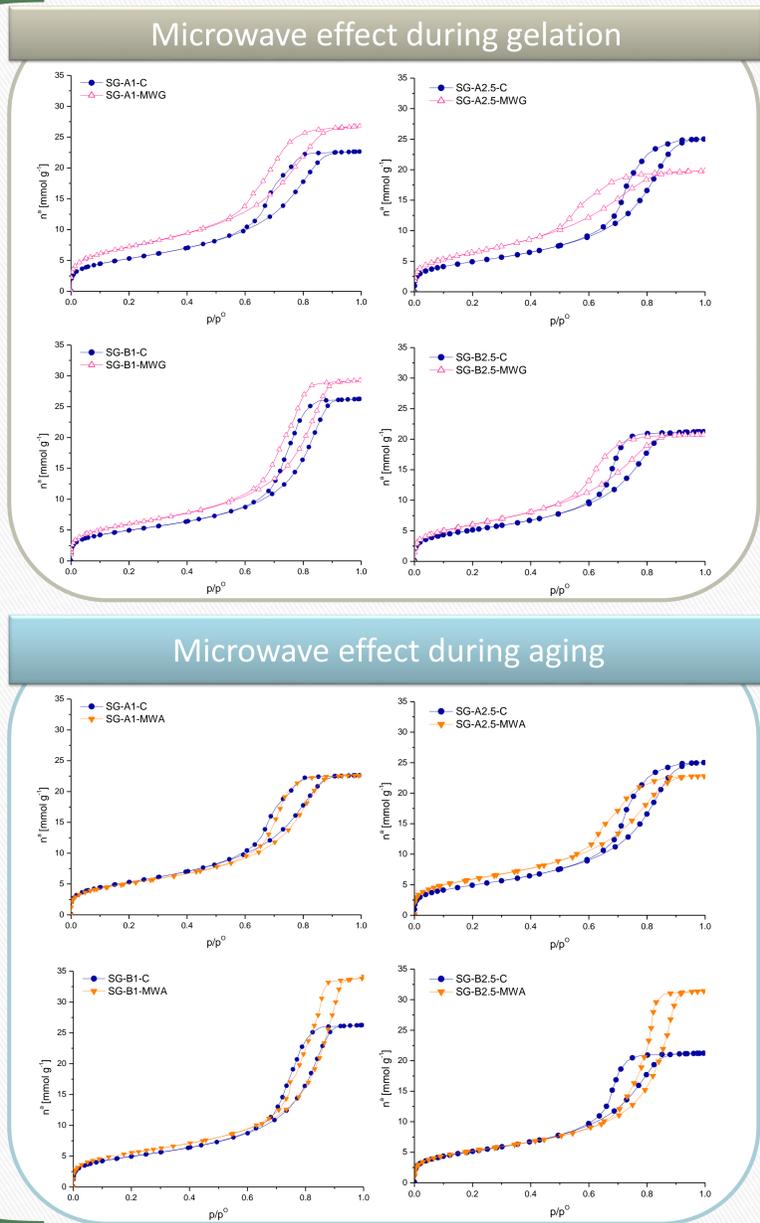
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Introduction

Synthesis of silica gels with tailored textural properties using the sol-gel process has been extensively studied. A synthesis composed by acid-gelation and basic-aging leads to mesoporous materials with acceptable pore volume due to the production of larger chains and the aging reactions [1,2]. However, even with the inclusion of several steps and special techniques, the entire conventional procedure is still time-consuming for their large scale production. The use of microwave heating could be an effective alternative. Until now, this technology has been only used for the drying step, but in neither case has the use of microwaves been analyzed at each stage of the synthesis process or optimized the exposure times [3]. In this study, the influence of microwave heating on each individual stage is evaluated in different precursor mixtures.



Results



Conclusions

The role of microwaves as a determining factor on the porous properties becomes more important during gelling, since a different polymer network is produced than in the conventional method thanks to an increase in cross-linking reactions during this step. This effect has not been previously detected in other kinds of materials and it could possibly be due to certain functional groups in silica intermediates that absorb microwaves.

Silica xerogels can be obtained through a quick and simple process based on microwave heating, resulting in silica gels with the same or better textural properties than previously reported xerogels, with considerable time savings and the use of moderate operating conditions of temperature and pressure.

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