

# Optimization of Microencapsulation Process for Self-Healing Polymeric Material

## Abstract

A series of poly(urea-formaldehyde) (PUF) microcapsules filled with dicyclopentadiene (DCPD) was successfully prepared by in situ polymerization. The effect of diverse process parameters and ingredients on the morphology of the microcapsules was observed by SEM, optical microscopy (OM) and digital microscopy. Different techniques for the characterization of the chemical structure and the core content were considered such as FT-IR and <sup>1</sup>H-NMR as well as the characterization of thermal properties by DSC. High yields of free flowing powder of spherical microcapsules were produced. The synthesized microcapsules can be incorporated into another polymeric host material. In the event the host material cracks due to excessive stress or strong impact, the microcapsules would rupture to release the DCPD, which could polymerize to repair the crack.

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Microcapsules; micro-cracking; in situ polymerization; self-healing; material; polyurea microcapsules; encapsulation; composites; SELF-REPAIR; CULTURE-CONDITIONS; COMPOSITE RESIN; DENTAL PULP STEM CELL; FUNCTIONALLY GRADED DESIGN; MULTI LAYERED POST; FUNCTIONALLY GRADED DENTAL POST; SOFT SKILLS; CLINICAL PAIRING; DENTAL PULP STROMAL CELLS; LONG-TERM EXPANSION

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