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[\[PDF \(3267K\)\]](#) [\[References\]](#)**Examination of composite resins with electron microscopy,
microhardness tester and energy dispersive X-ray microanalyzer**[Rogelio José SCOUGALL-VILCHIS](#), [Yasuaki HOTTA](#), [Masato HOTTA](#), [Taizo IDONO](#)
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Abstract:

This study was conducted to examine the ultrastructures of eight recently improved light-cure restorative composite resins with scanning and transmission electron microscopes (SEM and TEM). Additionally, Vickers hardness, volume/weight fraction of filler, and chemical composition were analyzed. Composite resins selected for evaluation were Beautiful II, Clearfil AP-X, Clearfil Majesty, Estelite Σ , Filtek Supreme, Filtek Z250, Solare, and Synergy. SEM and TEM images revealed a great diversity in ultrastructure, and Vickers hardness test showed significant differences amongst all the composite resins (except between Clearfil Majesty and Estelite Σ , and between Filtek Supreme and Filtek Z250). By means of EDX, similar elements such as C, O, and Si were detected, but the concentration was different in every composite resin. Results obtained in this study served to validate that the methods employed in this study — SEM and TEM at high magnification — were useful in examining the ultrastructures of composite resins. It was also found that the ultrastructure, size of filler particles, volume/weight fraction of filler, and chemical composition of the composite resins had an effect on Vickers hardness. Given the great diversity of ultrastructures amongst the composite resins, which stemmed from the different revolutionary technologies used to manufacture them, further studies are warranted in the search of clinical applications that optimally match the differing properties of these materials.

Key words:[Ultrastructure](#), [Microhardness](#), [X-ray microanalysis](#)

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