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Infrared and Raman spectroscopic study of the effect of high mechanical pressures on selected organometallic complexes embedded in poly(methylmethacrylate)

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Metal-containing polymers are of considerable industrial interest; they are currently being used in molecular electronics, solar panels and catalysis. In addition, organometallic complexes such as $Cr(CO)^6$, $(\eta^6\text{-}C_6H_6)Cr(CO)_3$ and $(\eta^5\text{-}C_5H_5)_2Fe$, when embedded in polymers, are used as infrared spectroscopy calibrants, photo-initiators for styrene polymerization and light absorbing layers in imaging devices, respectively. When subjected to high pressures, polymeric materials can evidence changes in molecular orientation, local chemical structure and even form new phases. With these possibilities in mind, we have investigated the effect of high mechanical pressures on the infrared and Raman spectra of poly(methylmethacrylate) (PMMA) and some organometallic complexes, e.g., $Cr(CO)_6$, $(\eta^5\text{-}C_5H_5)Mn(CO)_3$ and $(\eta^6\text{-}C_6H_6)Cr(CO)_3$, embedded in PMMA, up to ~70 kbar (70,000 atm) with the aid of a commercial diamond-anvil cell. The experimental aspects of these measurements will be described and the results obtained will be discussed

Biography

Ian S Butler has served as the Department Chair and Associate Vice-Principal (Research) at the McGill University since 1966. He is an honorary member of the Spectroscopy Society of Canada, a Fellow of both the Chemical Institute of Canada and the Royal Society of Chemistry. He has supervised about 200 researchers, resulting in the co-authorship of about 540 publications. His honors include the Gerhard Herzberg Award for Excellence in Spectroscopy and the David Thomson Award for Excellence in Graduate Teaching and Supervision. His current research focuses on structural changes induced by high pressures and variable temperatures, biomass conversion, mechanochemistry and art forensics.

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