

Abstract Submitted
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On the possibility of considering the fullerene shell C₆₀ as a conducting sphere MIRON AMUSIA, Racah Institute of Physics, The Hebrew University, Jerusalem 91904, Israel, ARKADIY BALTENKOV, Arifov Institute of Electronics, Tashkent, 700125, Uzbekistan — It has been shown that the fullerene shell in the static electric field behaves as a set of separate carbon atoms, rather than a conducting sphere [1]. We calculate the effective electric field $\mathbf{E}_{eff}(\omega)$ at the fullerene center when the external $\mathbf{E}(\omega)$ with frequency ω is applied to C₆₀. The modification of the external field comes from the effect of the dynamic dipole polarizability $\alpha_d(\omega)$ of the fullerene C₆₀ expressed via its total photoionization cross-section $\sigma(\omega)$ [2]. We calculate the ratio $\eta(\omega) \equiv \mathbf{E}_{eff}(\omega)/\mathbf{E}(\omega)$ and then investigate whether $\eta(0)$ is equal to zero. The equality of the ratio $\eta(\omega)$ to zero in the static limit $\omega \rightarrow 0$ is the critical condition being general for a conducting body with any form. For C₆₀ this ratio is $\eta(0) \approx 2$, i.e. C₆₀ is not a hollow metallic sphere. It is shown that at any ω the frequency dependence of the ratio of the fields $\eta(\omega)$ at the center of the C₆₀ molecule and outside it has nothing to do with $\eta(\omega)$ for the conducting sphere [1], which is additional evidence that the C₆₀ shell is strongly non-metallic. [1] J.-P. Comnerade and A. V. Solov'yov, J. Phys. B 38, 807 (2005) [2] J. Berkowitz, J. Chem. Phys. 111, 1446 (1999).

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