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ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ

"Stardust - Football - Solar Energy"

A modern fairy tale of elemental Carbon

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Carbon is the fourth most abundant element in the cosmos and the first to grow solid nano-aggregates that agglomerate fluffily and thus form ... “stardust”. In 1985, Kroto et al., eventually, discovered a cluster with 60 atoms in the mass spec-trum of carbon vapours. The team daring speculated that it could be the carrier of the famous 220 nm bump of the ISM, and that it was a closed cage molecule in the shape of a ... “football”. Hereupon, only a few related theoretical works on the expected electronic and vibrational spectra had been conducted. But five years later, surprisingly, a Heidel-berg team succeeded in the synthesis of C60 in large amounts and they confirmed the daring “football” speculation [1, 2]. Their paper triggered an amazing publication activity

>1000 papers/year (= World Championship). However, it turned out that the C60 cluster was unfortunately not responsible for the 220 nm bump as hoped...
So what! Football fever broke out in the scientific community. Youngster as well as se-nior scientists young-at-heart suddenly transformed into passionate football fans leav-ing their work and following their basic play instincts. They declared the C60 Games open with more and more athletic disciplines. They didn’t even notice that the “foot-print” of the amazing carbon cluster was discovered shortly afterwards in the spectral range of the so-called Diffuse Interstellar Bands. Its abundance was estimated to be 0.1% of the total interstellar carbon (= Interstellar Championship).
After its mass synthesis in 1990, C60 was found to be an excellent candidate for the acceptor component of such an organic solar cell (OSC) due to its enormous electron affinity. Therefore, novel OSC concepts based on C60 acceptors with significant power conversion efficiencies of up to η=2.5% were introduced in the new millennium [2]. This triggered generous governmental and private funding in the range of a billion € world-wide for the solar part of the C60 Games and the participating athletes. So that 2018 the efficiency record has increased seven-fold culminating in η=17.3% (Meng et al.)

Dr. Konstantinos Fostiropoulos is a Greek physicist with more than 80 publications and 10,000 citations, Senior Scientist at the Helmholtz-Zentrum Berlin für Ma-terialien and Energie. He studied Physics at Heidelberg University, where he also received his doctorate in February 1992. Fostiropoulos completed his thesis on “C60 - a new Form of Carbon” at the Max Planck Institute for Nuclear Physics in Heidelberg, where he developed methods for the preparation and isolation of C60 in quantitative amounts. His preparation method applying an electric arc process under vacuum conditions is used today as an industrial production process.