# Novel method to derivatise [60]fullerene

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We present the direct methylation of [60]fullerene *via* a gas-phase reaction in a $CH_4/H_2$ atmosphere was performed using a novel hot filament chemical vapour modification method. Pressures were varied from 10-60 mbar and substrate holder temperatures set at 690ºC.

High-resolution matrix assisted laser desorption ionisation mass spectroscopy analysis was an extremely important characterisation technique and showed mass signals corresponding to $C_{60}H_{18-2n}(H,CH_3)_n$. Collision-induced dissociation experiments confirmed a maximum of 18 ligands possible to the [60]fullerene cage.

We also present the formation of carbon spheres on the surface of the tungsten filament used in a hot filament chemical vapour deposition reactor. The concentration of the gas precursors (methane diluted in hydrogen) was varied from 3.5 up to 5 vol.% and the total working pressure from 30 to 35 torr. The reaction time was varied up to a maximum of 60 min. Analysis of the tungsten filament surface by scanning electron microscopy/energy dispersive X-ray analysis revealed smooth microspheres composed of carbon with diameters up to 25 μm. When increasing methane concentrations, pressure and reaction time the number density of the spheres and their diameters increased.

The mechanism of formation involves adsorption of hydrocarbon species onto the filament surface followed by the formation of tungsten carbide microspheres which act as nucleation centres for the growth of smooth carbon microspheres.