Arc pyrolysis of methane in argon atmosphere

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Our team have developed a method for the synthesis of fullerene soot from hydrocarbons in an alternating current electric arc plasma torch. Depending on the hydrocarbon used, the content of light fullerenes in soot was from 1.5 to 7 percent by weight. Such a low yield is associated with the interaction of the synthesis products with hydrogen formed by pyrolysis. In order to remove this hydrogen, oxygen is supplied to the plasma torch. The plasma torch used consists of two perpendicular channels made of graphite. On three sides of these channels are graphite rod electrodes. The fourth side is the exit from the electric arc zone. Argon is supplied to the electrode area to prevent soot settling on fluoroplastic insulators. Methane is fed into the arc burning zone. The reaction products are cooled in a water cooler and collected in a cyclone. The resulting carbon black was analyzed by various physicochemical methods: scanning electron microscopy, photon correlation spectroscopy, electron spectroscopy of the extract. Carbon amount varies from 89 to 97 percents. There is oxygen everywhere (from atmosphere).