Chemical Transformation of C_{60} Cluster in Aqueous Phase by Oxidants and UV Irradiation

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Professor Jae-Hong Kim and Professor Joseph Hughes at Georgia Institute of Technology reported that water stable C_{60} colloidal aggregate (termed nC_{60}) undergoes chemical derivatization due to reaction with ozone, hydroxyl radical or short-wavelength UV irradiation. These reactions led to formation of water-soluble, molecularly dissolved fullerene oxides. Figure 4.x shows dissolution of nC_{60} in water as a result of reaction with ozone.

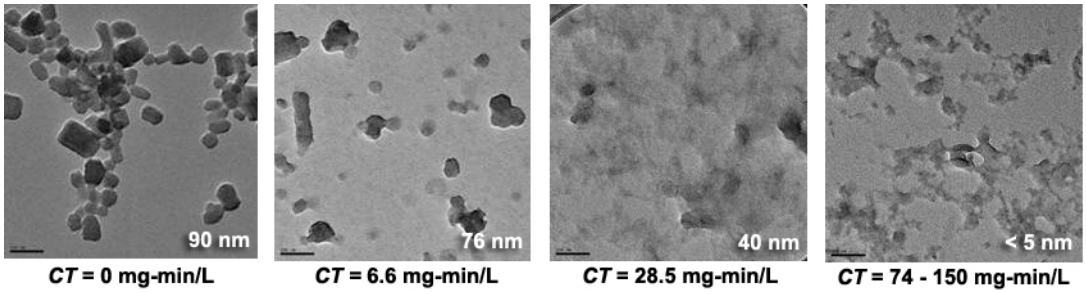

Figure. *Caption*.

The toxicological effect of reaction product was further found to vary depending on the oxidation process. Ozone treated C_{60} was found to be able to penetrate into *Escherichia coli* and produces hydroxyl radical as a main agent for cell inactivation. In contrast, UV treated C_{60} was found to be less toxic than its parent compound, nC_{60}.

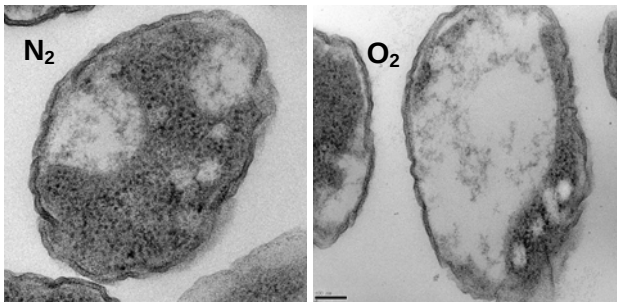

Figure. *Caption*.

References/Publications

Cho, M.; Fortner, J.D.; Hughes, J.B.; Kim, J.H. 2009. *Escherichia coli* inactivation by water soluble ozonated C_{60}: Kinetics and mechanisms. *Environmental Science & Technology* (submitted).

Fortner, J. D.; Kim, D. I.; Boyd, A. M.; Falkner, J. C.; Moran, S.; Colvin, V. L.; Hughes, J. B.; Kim, J. H. 2007. Reaction of water stable C_{60} aggregates with ozone. *Environmental Science & Technology* 41, 7497-7502

Lee, J.; Cho, M.; Fortner, J.D.; Hughes, J.B.; Kim, J.H. 2009. Transformation of aggregated C_{60} in the aqueous phase by UV irradiation. *Environmental Science & Technology* (submitted)