X-ray Nanochemistry: Recent Developments in the Guo Lab

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In this talk I will discuss a few new developments made in my research group in the past two years. X-ray nanochemistry is defined as using nanomaterials to enhance the effect of X-rays. My group has investigated three types of enhancement, which are average and nanoscale physical enhancement and chemistry enhancement.[1-4] The average physical enhancement is caused by energetic electrons released from X-ray absorbing nanomaterials such as gold nanoparticles dissolved in water. Nanoscale physical enhancement is caused low energy (< a few keV) electrons. Chemical enhancement is caused by the surface of nanomaterials reacting with reactive oxygen species generated from X-ray irradiation of water. All these enhancements are measured with chemical probes such as hydroxylation or polymerization or DNA breaks in aqueous solutions. We have determined the theoretical upper limit of average physical enhancement and confirmed it experimentally. We have also measured tens of times of chemical enhancement. Other developments are discussed, including other types of physical enhancement and means to focus X-ray beams.

Keywords： X-ray nanochemistry, X-ray enhancement, nanoscale energy deposition,

References

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