

Abstract Submitted
for the SES07 Meeting of
The American Physical Society

Detection of Free Radicals in Vitamin E-doped Ultra-High Molecular Weight Polyethylene¹ BENJAMIN WALTERS, Department of Physics, The University of Memphis, TN 38152, Mentor: M. Shah Jahan — Free-radical-induced oxidation of ultra-high molecular weight polyethylene (UHMWPE) liners of the artificial hip- or knee-joint adversely affects the performance of the total joint. [1] To combat oxidation, vitamin E is added to UHMWPE as an antioxidant. [2] In this study, we use 10% by wt. vitamin E (alpha-tocopherol) in UHMWPE powder. Free radicals are produced by irradiating test samples with x-rays and detected using an X-band electron spin resonance (ESR) spectrometer. Test samples for this study are: 1. vitamin E-UHMWPE mixed before irradiation; 2. non-irradiated vitamin E mixed with irradiated UHMWPE; 3. irradiated vitamin E; and 4. irradiated UHMWPE (control). ESR spectra are recorded as a function of time for more than two weeks. While control shows the presence of alkyl/allyl/polyenyl radicals, the vitamin E-mixed powder presents additional signals in the spectrum due to tocopheroxyl radicals. Analyses of the preliminary ESR data will be presented. References: [1] M.S. Jahan et al., Biomed. Mater. Res. 25 (1991) 1005. [2] N. Shibata et al., J. Biomed. Sci. Eng., 1 (2006) 107.

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Date submitted: 20 Aug 2007

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