Abstract Submitted
for the DNP10 Meeting of
The American Physical Society

7-Be Implantation in Plastics for Prosthesis Wear Studies[1] UWE
GREIFE, L. ERIKSON, N. PATEL, Colorado School of Mines, M. WIMMER, Y.
DWIWEDI, M. LAURENT, Rush University Medical Center, K. CHIPPS, Rutgers University, J. BLACKMON, Louisiana State University, R. KOZUB, Tennessee Technological University, D. BARDAYAN, C. GROSS, D. STRACENER, M.
SMITH, C. NESARAYA, Oak Ridge National Laboratory, E. REHM, I. AHMED, J.
GREENE, Argonne National Laboratory — The current generation of highly cross
linked ultrahigh molecular weight polyethylenes (PE) for hip and knee joint replacement have achieved such low in vitro wear rates that efforts have been underway
to develop more sensitive methods to measure polyethylene wear. The most widely
used technique, the gravimetric method, suffers from the notable disadvantage that
mass gain by fluid absorption can considerably exceed mass loss by wear, making the wear measurement inaccurate, sometimes even leading to negative "wear"
values. The purpose of this experiment was to investigate the use of a radioactive
tracer, beryllium-7 (7-Be), to circumvent the problem of fluid absorption and thereby
achieve a much more sensitive and accurate wear measurement. This proof of principle study demonstrated the general feasibility of 7-Be implantation (performed at
the Holifield Radioactive Ion Beam Facility of Oak Ridge National Laboratory) for
PE wear analysis.

Uwe Greife
Colorado School of Mines

Date submitted: 22 Jun 2010

Electronic form version 1.4