



Annealed linear high density polyethylene and preparation thereof

Description of Technology: What is provided is an annealed, linear, high density polyethylene (LHDPE) and a process for the preparation of tough impact resistant articles made of such materials.

Patent Listing:

1. **US Patent No.** 5,468,842, Issued on November 21, 1995, “Annealed linear high density polyethylene and preparation thereof.”

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HTTOFF&p=1&u=%2Fmetahtml%2FPTO%2Fsearch-boul.html&r=1&f=G&l=50&co1=AND&cd=PTXT&s1=5,468,842.PN.&OS=PN/5,468,842&RS=PN/5,468,842>

Market Potential: The products of the present invention process have dramatically improved impact resistance and higher tensile stress at yield. Many also show much higher elongation at break. Remolding or other melt processing of the polymer articles after heat treatment should be avoided. However, the invention product can be remelted without loss of improved properties, provided that agitation of the molten polymer is avoided.

The products of this invention are especially useful in load-bearing applications such as seals, bushings, bearings, prosthetic devices and the like where non-annealed LHDPE as well as other polymers are currently used. Articles processed according to this invention have strength properties approaching those of ultrahigh molecular weight polyethylene (UHMWPE), yet the starting polyethylene is of low molecular weight (relative to UHMWPE) and can easily be formed or fabricated by, for example, injection molding; UHMWPE is not injection moldable because of its essentially infinite melt viscosity which results in void formation and loss of properties during fabrication.

Hanger Orthopedic Group is the market leader of prosthetics in the US, an industry in which this invention is applicable. As of December 2005, Hanger had a net profit of \$24.1 million for the year after generating \$578.2 million in revenue. The other competitors in the industry include Zimmer Holdings, Inc.; Biomet, Inc.; Smith & Nephew plc; and Stryker Corporation. Biomet, Inc., based in Indiana, has global operations and had a net income of \$325.6 during the 2004 fiscal year. Smith & Nephew plc is based out of England and has global operations that resulted in a net profit of 148.1 million pounds in the 2003 fiscal year. Stryker Corporation is based out of Michigan and has global operations that resulted in a net income of \$435.5 million in the 2004 fiscal year.

Benefits:

- Improved impact resistance
- Higher tensile stress at yield.
- High elongation at break.
- Easily formed by injection molding.

Applications:

- Load-bearing applications
- Prosthetic devices

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