

# Study the influence of particle size on the molecular weight of polyethylenes with high or ultrahigh molecular weights (UHMWPE).

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Polyethylenes with high or ultrahigh molecular weights (HMWPE or UHMWPE) have received much attention due to their excellent mechanical behavior. Since the properties of polyethylene, such as fatigue resistance, wear resistance and ultimate tensile strength, depend largely on its molecular weight, both the molecular weight and its distribution must be determined<sup>1</sup>. Also it is known that the mechanical properties of UHMWPE depending on the particle size of the polymer. In this work two different types of polyethylene of ultra high molecular weight were evaluated for particle size, shape granule and molecular weight distribution.

One can visualize the molecular chain of UHMWPE as a tangled string of spaghetti, over a kilometer long. Because the chain is not static, but imbued with internal (thermal) energy, the molecular chain can become mobile at elevated temperatures. When cooled below the melt temperature, the molecular chain of polyethylene has the tendency to rotate about the C–C bonds and create chain folds. This chain folding, in turn, enables the molecule to form local ordered, sheet-like regions known as crystalline lamellae. These lamellae are embedded within amorphous (disordered) regions and may communicate with surrounding lamellae by tie molecules<sup>2</sup>.

Figure 1 presents the SEM images of UHMWPE at magnification (a) 100 X, (b) 500 X and (c) 5000 X.

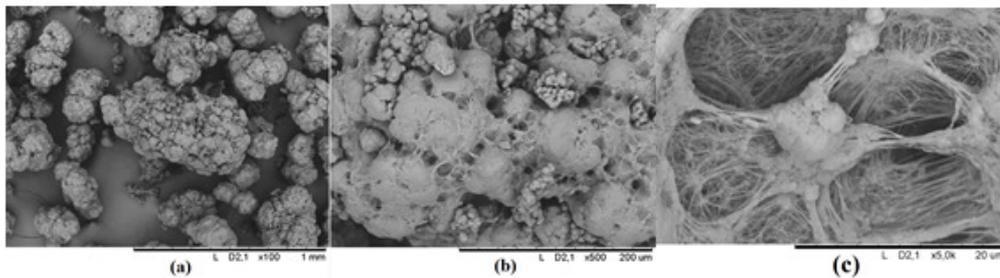


Figure 1. SEM images of UHMWPE

In this presentation two different types of polyethylene of ultra high molecular weight (Sample A – Mw: 3.000.000 and sample B, Mw: 6.000.000) were evaluated for particle size (Figure 1), shape granule and molecular weight distribution (Figure 2).

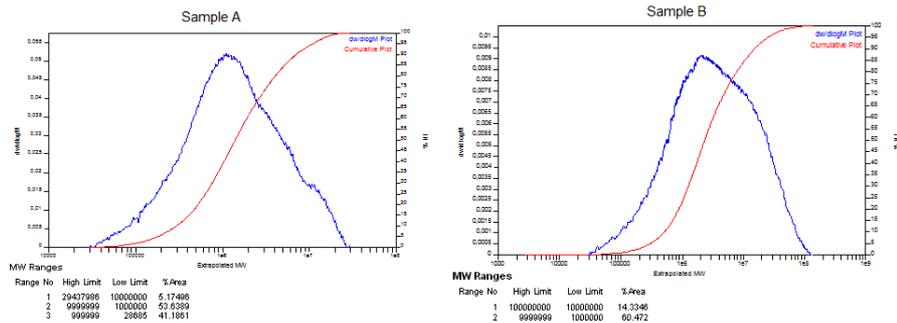


Figure 2. Profile molecular distributions for UHMWPE

## References:

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