



## Product Name MPM<sup>®</sup> 2000

**Product Description:** MPM<sup>®</sup> 2000 is a pelletized masterbatch containing a high performance, proprietary beta nucleant formulation in a polypropylene homopolymer resin. This masterbatch is specifically designed to be used with non-nucleated and certain alpha-nucleated polypropylene polymers including homopolymers, random copolymers, and heterophasic impact copolymers, in order to produce high levels of beta phase crystallinity in extruded sheets, films, and injection molded parts.

**Introduction:** When the MPM<sup>®</sup> 2000 is added to polypropylene at levels ranging from 0.5% - 2.0%, it can produce high levels of beta crystallinity in molded or extruded parts. The high beta crystal content results in dramatically higher impact strength and ductility, with very little reduction in modulus or tensile strength. If the final fabricated article is produced by post-orientation of an extruded sheet at temperatures below the melting point of the beta crystal phase, then microvoids will develop, and the density of the article will go down, and its opacity will go up. In the case of oriented films it is possible to lower the final film density by 15% when uniaxial stretching is done (MOPP), and by up to 70% when biaxial stretching (BOPP) is done. In the BOPP process it is possible to make breathable films when high levels of porosity are achieved. When the thermoforming process is used, the processing window of polypropylene is broadened dramatically, and cycle rates can be increased by 25%. Material distribution in the final part is also improved leading to potential down-weighting of thermoformed food containers by 15%. Beta nucleation can also be used to increase the tensile strength of biaxially oriented geogrids allowing for down-weighting of 15-20%. MPM 2000 can be used effectively in polypropylene resins that are already alpha-nucleated with either sodium benzoate or talc, and MPM 2000 may also work in the presence of other alpha nucleants, such as certain pigments. MPM 2000 is colorless, and all of the component ingredients in MPM 2000 are allowed in food contact applications for all foods up to use temperatures of 125 °C, under FDA and EU food contact regulations.

**Material Description:** White, free-flowing pellets

**Chemical Name:** Proprietary

**Empirical Formula:** Proprietary

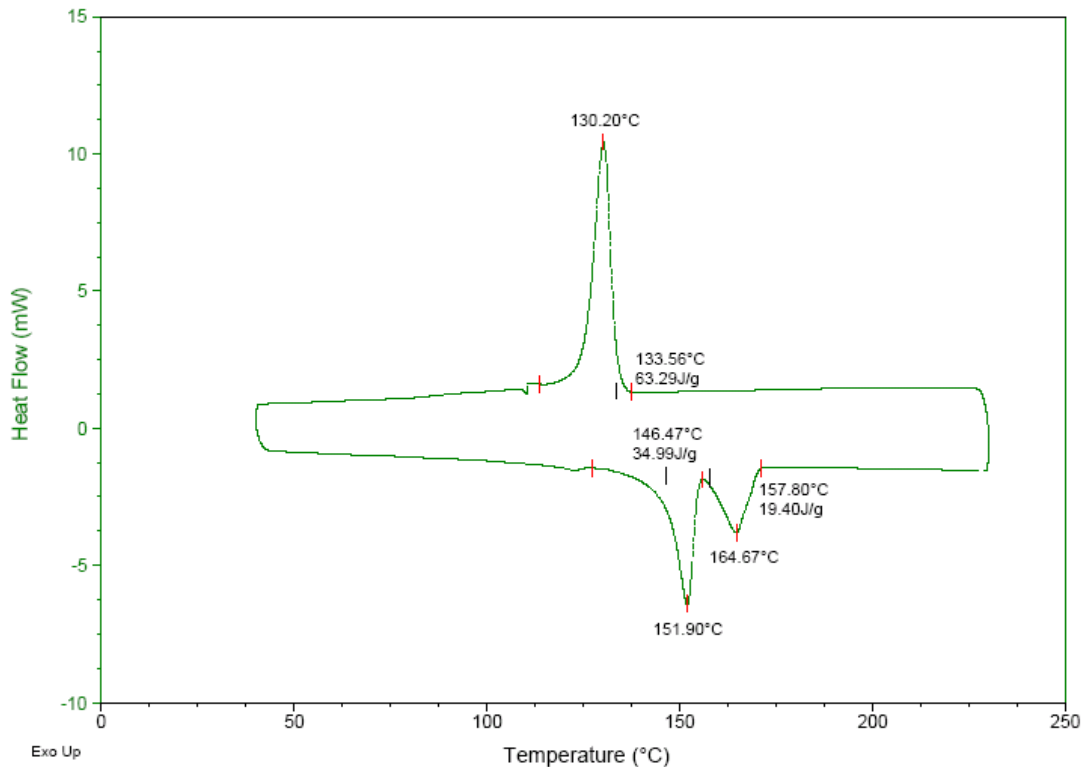
**CAS#:** Proprietary

**Chemical Structure:** Proprietary

**Physical Properties:**

**Melt Flow Rate:** 12 g/10 min.  
**Melting Range:** Dual melting peaks <sup>(1)</sup>:  
148 – 155 °C for the beta crystal phase  
162 – 167 °C for the alpha crystal phase  
**Specific Gravity (20°C):** 1.08 g/cm<sup>3</sup>

The beta nucleant in the MPM 2000 will produce high levels of beta crystallinity in molded or extruded parts, when processed under the right conditions. The beta crystal phase exhibits a melting point in the DSC (Differential Scanning Calorimetry) that is about 15 °C below that of the alpha crystal phase. An example of heating and cooling DSC scans of a polypropylene containing 1% of the MPM 2000 are illustrated in the following figure. Both scans were performed at heating and cooling rates of 10 °C per minute under nitrogen. The heating scan is from the 2<sup>nd</sup> heat of the material. The crystallization temperature of 130 °C is very high for a beta nucleated material, and this can lead to very short cycle times in molded parts.



**Solubility:** Insoluble in water and most solvents

**Applications:** Injection molding, Thermoforming, Rotomolding, Blow molding, Blown film, Oriented film, Breathable film, Geogrids, Carpet backing tapes, Mineral and Glass filled composites

### Advantages:

- Can be added at the extruder hopper to produce extruded sheet or injection molded parts with high levels of beta crystallinity, and high impact strength.
- Can be used with certain alpha-nucleated PP resins, where other beta nucleant masterbatches would not be effective.
- Broadens the processing window for thin gauge thermoforming, and produces thermoformed containers with more uniform material distribution and improved crush strength and rigidity, with lower sidewall density. This higher top load crush strength can be used to down-weight containers by 15%. The microvoiding effect can reduce the need for TiO<sub>2</sub> pigment in order to produce white containers.
- Faster cycle rates in both injection molded and thermoformed part production
- Reduces the density of oriented films, and can produce breathability in BOPP films
- Improves the tensile strength of biaxially oriented geogrids allowing for down-weighting of 15-20%
- All of the components of the masterbatch are FDA and EU approved for food contact applications.

### Loading

**Instructions:** The loading data and results are based on laboratory work (and field-testing) under controlled conditions and do not necessarily indicate the result that the buyer or user will attain. For this reason, we strongly recommend testing of your own system under the actual conditions of processing and end-use prior to full scale testing. The generally recommended loading concentration range is between 0.5% and 2.0% depending on the base polypropylene resin, the processing conditions used, and the presence of any other additives that may have nucleating characteristics such as certain pigments. Although the MPM® 2000 is designed to be used with certain alpha-nucleated PP resins, it does not work with all alpha nucleated polypropylenes, and it must be evaluated on a case-by-case basis.

**Packaging:** In the US: 200 lb drums and 1000 lb gaylords. In Europe: 25 kg bags

**Storage:** This product may be stored up to two years in a sealed container. Containers should be stored in a cool, dry area. Extended storage at elevated temperatures or exposure to direct heat or sunlight could reduce product life. Keep containers sealed when not in use.

### Toxicity &

**Safety:** This material is not intended for use in products for which prolonged contact with mucous membranes or abraded skin, or implantation within the human body is specially intended, unless the finished product has been tested in accordance with the Food and Drug Administration and/or other applicable safety testing requirements. Because of wide range of such potential uses, Mayzo, Inc. is not able to recommend this material as safe and effective for such uses and assumes no

liability for any such uses. Read and understand the Material Safety Data Sheet before using or handling this product.

**FDA:** The components of this product fall under one or more of the following categories for use in contact with food:

- Components that are exempt from regulation under 21 CFR 170.39 “Threshold of Regulation for Substances Used in Food Contact Articles”.
- Polymers and/or additives listed in the appropriate parts of 21 CFR (174, 175, 176, 177, 178, 181, 184, and 186).
- Substances that, based on legal opinion, supplier certification, and/or extraction results from food-simulating solvents, are not food additives and are acceptable for this application in full compliance with the Federal Food, Drug, and Cosmetic Act and all applicable food additive regulations.
- Substances that are GRAS (Generally Recognized as Safe) for direct addition to food or for use in contact with food.
- Substances that are “Prior Sanctioned” for use in this application.

**Processing:** In order to maximize the beta crystal content of extruded sheet, the cast roll should be heated to at least 80 °C, and should preferably be in the range of 90 – 130 °C. Mayzo will provide technical assistance to customers in order to help them optimize the processing conditions for their particular application.

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