Because of its high thermal stability, magnesium hydroxide is widely used in various industries as a flame retardant in the production of thermoplastics and polymer composites materials. Using high energy electron beam to modify magnesium hydroxide is a perspective approach for the demand of enhancing the predominant properties of this material.

The influence of high energy electron beam irradiation on thermal properties, as well as the influence of different irradiation doses on particle size distribution of studied magnesium hydroxide were investigated. The changes of thermal behaviors and particle size distribution of studied sample were analyzed by using thermogravimetric analysis/differential scanning calorimetry and image analysis, respectively.

Thermal decomposition behaviors were determined under conditions of inert atmospheres at a heating rate of 10°C/min from 35°C to 1000°C and the irradiation dose of 60 kGy.

SR-XRPD was performed in the temperature range from 60°C to 600°C at a heating rate of 10°C/min. PSD measurement of the studied specimen was carried out at the different irradiation doses of 0, 20, 40, 60 and 120 kGy.

**TABLE 1.** TG temperature data of T_{ini} and T_{max}

<table>
<thead>
<tr>
<th>Dose (kGy)</th>
<th>T_{ini} (°C)</th>
<th>T_{max} (°C)</th>
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<tbody>
<tr>
<td>0 kGy</td>
<td>104,986</td>
<td>383,5</td>
</tr>
<tr>
<td>60 kGy</td>
<td>88,714</td>
<td>338,714</td>
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</tbody>
</table>

**FIGURE 2** – SR-XRPD diffractograms of initial Mg(OH)_{2} during heating

**FIGURE 3** – The particle size distribution curves

1. The initial temperature of mass loss of the irradiated magnesium hydroxide is lower than that of the sample without irradiation;
2. The quantities of released water and carbon dioxide gas of irradiated specimen are also higher than these values of non-irradiated one;
3. The endothermic effects of decomposition reaction of irradiated sample are stronger than that of the sample without irradiation;
4. The particle size of the sample becomes smaller after being irradiated.