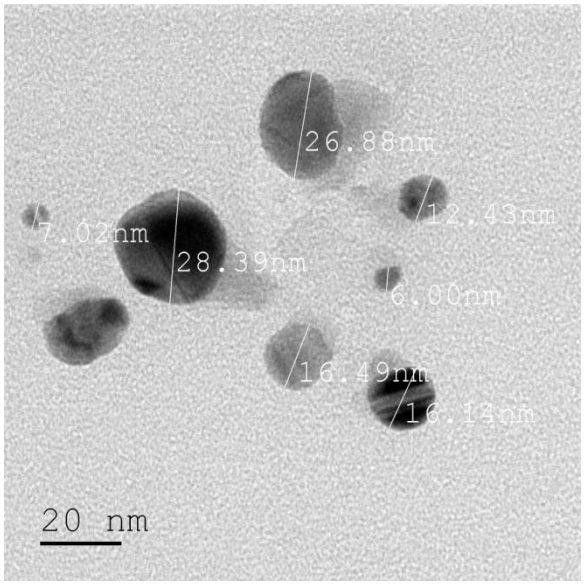
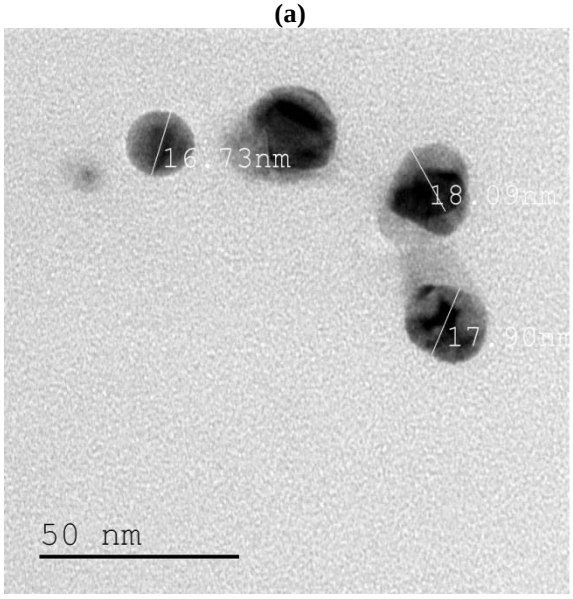
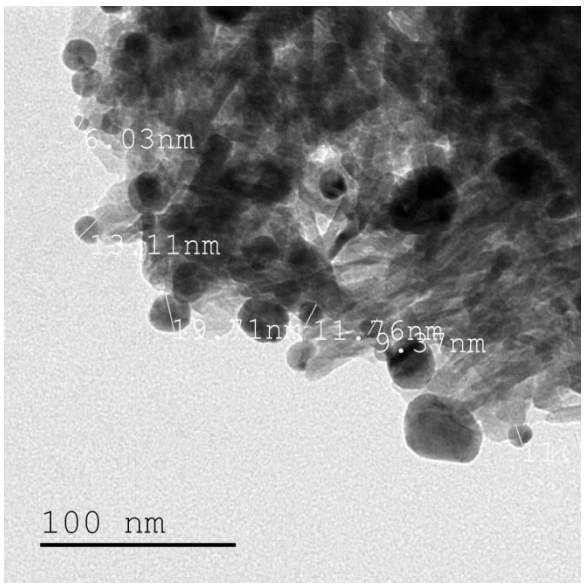


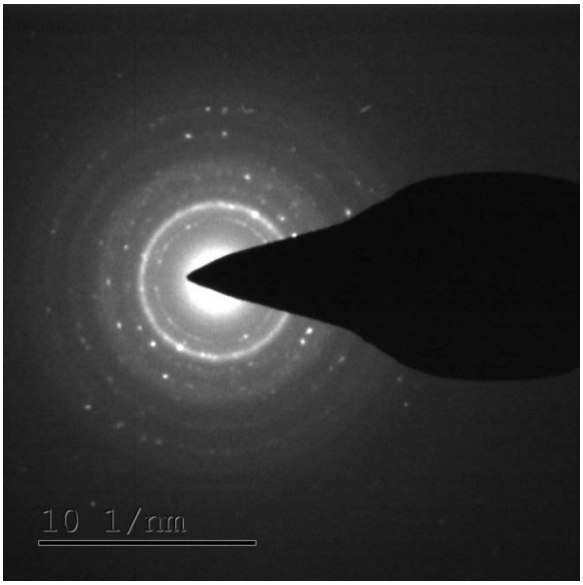

**(a)**




**(b)**




**(c)**




**(d)**

**Figure 3:** (a), (b), (c) TEM images of HAp/PMMA nanocomposite and (d) is selected area electron diffraction (SAED)

### 3.4 TG/DTA

The Thermal gravimetric (TG) analysis is performed in an atmosphere (i.e.) air (or) oxygen with a linear ramp temperature. The maximum temperature showed be so selected that the weight of the specimen is stable at the end of the experiment. Thermal stability of as synthesized nanoHAp/PMMA was analyzed using Perkin Elmer experiment for TG-DTA. The TG of the HAp/PMMA nano composites powder was carried out between 30 °C to 800 °C in air at a heating rate 25 °C /min. The decomposition behaviour of HAp/PMMA nano composite is as shown in fig.4. In the TG curves several steps are observed (Rajendran et al. 2002; Singh et al. 2008; Wang et al. 2007). The first step, showing a small decrease in weight, is associated with adsorbed water-removing when heated above 80 °C. The second step, from 190 °C to 380 °C may be due to the C-OH groups. This temperature shifts to a higher temperature, when the nano HAp content increases. In DTA curve initially, there are series of small curves occurs which is followed by a broad curve between approximately (200 °C to 300 °C). This is occurring because evaporation of water in calcium hydroxide happens. Similarly the other endothermic peaks in the curve (305°C to 420°C) related to the removal (or) addition of their groups during the synthesis of HAp/PMMA powder. However in the starting at 150°C a sharp exotherm indicates the crystallization of HAp.

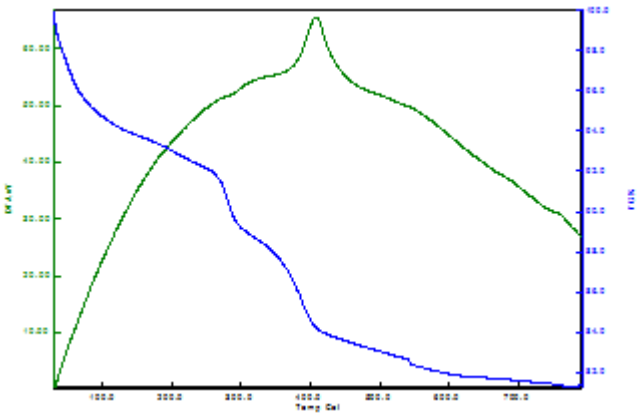


**Figure 4:** DTA-TG analysis of synthesized HAp/PMMA Nano composite

## 4. Conclusion

The biodegradable polymers properties do give definite impact on the bone healing, formation, regeneration (or) substitution for human body. Nano hydroxyapatite / PMMA have been successfully synthesized using the wet chemical method. The HAp composites when examined by FTIR spectroscopy clearly show the presence of HAp and polymer components in the composite. The XRD studies also confirm the nano sized HAp powder in native state as well as in composites. The size and morphology of the samples were characterized using by transmission electron microscopy. The spherical shaped particles were confirmed through the TEM analysis. Thermal properties of the material assigned by DTA/ TG analysis, meet the thermal requirement of these types of materials. In addition, at the implantation period, assessed, the extent of newly formed bone on the polymeric regeneration on HAp implants. These findings indicate that the tested polymers are suitable scoffolds for a bone tissue engineering approach in the treatment of bone defects.

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