

# INVESTIGATION OF GARNET AND POLYMER COMPOSITES

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Over the last decades energy conservation has become a major issue. Conventional light sources such as simple wolfram lamps consume a large amount of electricity. A lot of energy can be saved by using LED lights instead of conventional ones. Cerium doped yttrium aluminium garnet is one of the most important luminescent materials that can be used in light emitting diodes (LED) to improve the quality of lighting [1]. LED lamps exhibit good energy and quantum efficiency, high color stability and are ecological. However, light emitting diodes have problems, such as short life span and reliability. One of the main causes for these problems is epoxy resin, whose small resistance to high temperature leads to failure of the diode [2]. To remove this flaw polymer is added. Polymer can also raise luminescence intensity which in turn would allow to use smaller amount of garnet and influence other luminescence properties [3]. By selective addition of polymers different consistency composite tablets can be obtained. Ranging from glass to rubber like for various applications [4].

For this project different composites were prepared, which could be used in LED in order to improve their longevity and reliability. For the reason, YAG:Ce phosphor powder was synthesized by sol-gel method and then mixed together with either M600, M280 or EGDMA monomer which was polymerized under UV light into tablets. Composite powders were also prepared. Composites were analyzed by x-ray diffraction (XRD), scanning electron microscopy (SEM) and differential scanning calorimetry (DSC). Moreover, quantum efficiency, decay times, emission spectrum have also been investigate.

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