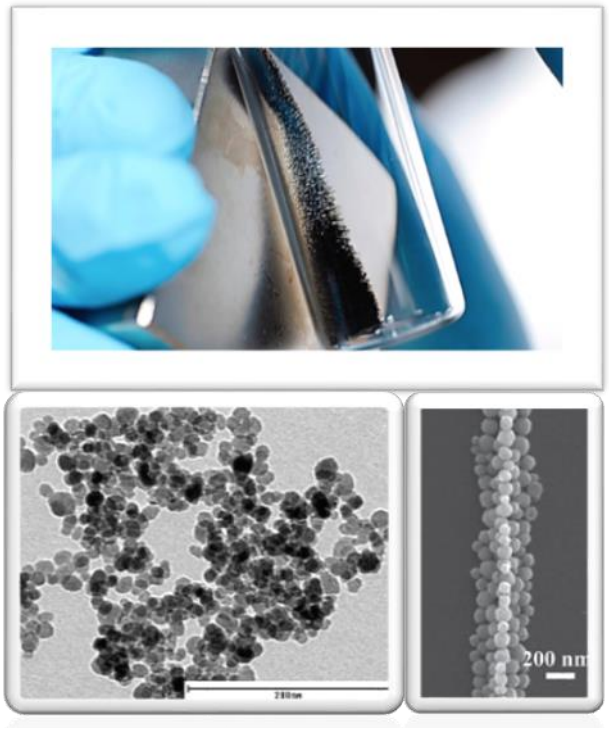

It is an indisputable fact that cancer is one of the most difficult diseases with more and more occurrences with the passage of time. Even though many treatments are dealing with this problem such as chemotherapy and radiotherapy, none of them can completely destroy the cancer sides with negligible side-effects simultaneously. Magnetic particle hyperthermia seems to be a promising least-invasive and synergistic cancer therapy exploiting heat release by magnetic nanoparticles (MNPs) when they exposed to an alternating magnetic field. In this work, it is presented a facile way to arrange magnetite nanoparticles into 3D linear chains in order to tune their collective magnetic features and see how this affects thermal or in other words magnetic hyperthermia efficiency. Thus, 10, 20, 50 and 80nm in average diameter magnetite nanoparticles were dispersed into hot agarose gel and left to cool down at ambient temperature. During the cooling state, specimens were placed inside adequate static magnetic fields to drive the magnetic nanoparticles in linear arrangements and freeze in specific positions. Scanning Electron Microscopy imaging reveals the successful, at different degree chain formation, with respect to nanoparticle size, specimen concentrations and field conditions. Static magnetometry clearly outlines the successful formation of chains, while the role of chain arrangement is directly reflected to heating efficiency of magnetic nanoparticles as defined by the specific loss power (SLP), a factor related to magnetic hyperthermia efficiency.