Title (2)	:	**Fabrication and Characterization of Magnetic Cellulose–Chitosan–Alginate Composite Hydrogel Bead Bio-Sorbent**
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Abstract	:	The implementation of inorganic adsorbents for the removal of heavy metals from industrial effluents generates secondary waste. Therefore, scientists and environmentalists are looking for environmentally friendly adsorbents isolated from biobased materials for the efficient removal of heavy metals from industrial effluents. This study aimed to fabricate and characterize an environmentally friendly composite bio-sorbent as an initiative toward greener environmental remediation technology. The properties of cellulose, chitosan, magnetite, and alginate were exploited to fabricate a composite hydrogel bead. The cross linking and encapsulation of cellulose, chitosan, alginate, and magnetite in hydrogel beads were successfully conducted through a facile method without any chemicals used during the synthesis. Energy-dispersive X-ray analysis verified the presence of element signals of N, Ca, and Fe on the surface of the composite bio-sorbents. The appearance and peak's shifting at 3330–3060 cm−1 in the Fourier transform infrared spectroscopy analysis of the composite cellulose–magnetite–alginate, chitosan–magnetite–alginate, and cellulose–chitosan–magnetite–alginate suggested that there are overlaps of O-H and N-H and weak interaction of hydrogen bonding with the Fe3O4 particles. Material degradation, % mass loss, and thermal stability of the material and synthesized composite hydrogel beads were determined through thermogravimetric analysis. The onset temperature of the composite cellulose–magnetite–alginate, chitosan–magnetite–alginate, and cellulose–chitosan–magnetite–alginate hydrogel beads were observed to be lower compared to raw-material cellulose… see more.