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Pollution and environmental impact of waste dumps in Armenia

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Waste accumulation and subsequent cultivation for Armenia is an important environmental issue especially environmental pollution due to heavy metals, in view of inadequate sanitary-hygienic and technical conditions and the absence of regulatory measures. In Armenia, one of the major sources of pollution is by heavy metals arising from open pit operating mines, mining and chemical factories, foundries and their tailings and waste dumps abandoned by mine operators. As an object of our research, we've chosen chemical waste dump of chemical plant of Vanadzor in Vanadzor city of region Lori of Armenia. In north-west part of Vanadzor, there are synthetic fibers plant and thermal power plant (TPP) within 4.1km distance from Vanadzor chemical plant, co-located with two waste dumps (TL1 and TL2) of wastes of plant. They are filled with wastes of melamine ($C_3H_6N_6$), calcium carbide (CaC_2), ammonia (NH_3) and various derivatives of ammonia, etc. Vanadzor chemical plant waste dump is not in use since 1988, when it ceased production of ammonia and derivatives of ammonia. Plant doesn't implement proper control towards the waste dump. The groundwater, soil, sediments and surface water are contaminated with heavy metals and ammonium, sulfates and different organics. Local population uses the water for irrigation, animal feed and beekeeping that can penetrate in human organism or in animals and plants and accumulate there. We are sampling waste dump and measure content of different heavy metal contaminations. The investigation using nanomaterials and sensors has shown that the most of measured heavy metals concentrations were higher than maximum contaminant levels (MCL). For example, concentration of cadmium is higher more than 190 times, arsenic 30, lead 4, nickel 45, molybdenum 8, etc. Waste dump can create best conditions for development of many viruses, bacteria and pathogens. In conditions of polluted environment, population gets more vulnerable and susceptible to different diseases. The quality and productivity of crops and cattle get low and using of products from this territory will be hazardous. Today for security and control of waste dump, it is necessary to study the impact of pollution and its body burden using nano-materials and secure financial investments for remediation. We further note that the chemical plant of Vanadzor now isn't operating. But for future planned reoperation, which once again underscores importance of research of current situation and ecological assessment of waste dump and preparing and implementing of management plan.

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Non-isothermal crystallization and thermal stability of polypropylene/multi-wall carbon nanotubes nanocomposites

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This paper describes the preparation and characterization of polypropylene (PP)/multiwall carbon nanotubes (MWCNTs) nanocomposites. Two types of commercial MWCNTs at two different loadings (1 and 3 wt%) were added in PP via melt compounding method by using a twin screw extruder. Afterward, the molded samples were fabricated from the extrudate pellets using an injection molding machine. Differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA) were used to study the crystallization behavior and thermal stability properties of the nanocomposites. The DSC results revealed that the presence of MWCNTs in PP matrix acted as nucleating agent, which enhanced the crystallization process of PP matrix. Meanwhile, the TGA results showed that the addition of MWCNTs dramatically increased the thermal stability of PP/MWCNTs nanocomposites. Generally, MWCNTs type C-70P showed a better improvement on crystallization and thermal stability properties compared to type C-150P.

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