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2016) IOP Publishing IOP Conf. Series: Materials Science and Engineering 223 (2017) 012027 doi:10.1088/1757-899X/223/1/012027 and has high elasticity properties. Nanoparticle technology, particularly in semiconductors has been expanding applications in biological and biomedical fields. Compound semiconductor nanoscale dimensions can be used as sensors to the cells of the human body, capable of detecting the cancer so that treatment would be more effective [4-8]. Polyvinyl alcohol (PVA) is one type of hydrophilic polymer that is widely used in various fields, especially chemistry, pharmaceuticals and health. PVA can be mixed with other materials to obtain a composite that better suit its usefulness [9]. Gea (2010) [10] has been mixing PVA with bacterial cellulose increase Young's modulus, Campos [11] mixing PVA with silver (Ag) to obtain a higher conductivity properties. Zhang et al., (2011) [12] adds graphene oxide on PVA to produce a composite that has high tensile strength. The products produced as a result of this process generally has good physical properties, non-toxic and have the ability to absorb the relatively high water and biocompatible [13]. PVA hydrogel crosslinked is one of the PVA polymer modified. The hydrogel has a three-dimensional network structure which allows the inclusion of other substances into it. Therefore, the hydrogel matrix used for immobilization drugs, cells, enzymes, and polysaccharides [14]. PVA hydrogel is one type of hydrogel which in recent years have been developed for applications both for the purposes in the field of chemistry, health and biomedicine. It has unique properties, among others,PVA is sensitive to temperature and has a transition temperature of 58oC with partially hydrolyzed to 85oC with a degree of hydrolyzed. Because the melting point of PVA is relatively low, it is necessary to have an amplifier that can improve the physical properties of the material. So in the research, the addition of ZnS improved the mechanical and thermal properties of PVA/ZnS nanocomposite. 2. Materials and Methods Materials used in this study are zinc asetat 99%, Thiourea 99%, Polyvynil Alcohol 98% each of Merck Darmstadt Germany. Tools used in this study are X-Ray Difraction (Philips Analitycal PW 1710 Based), Scanning Electron Microscopy (SEM) (Zeiss and JOEL Model), Universal Testing Mechanic (Laryee Universal Testing Mechine Wdw-10 model), Differential Scanning Calorimetry (Mettler Toledo type 821). The method used for the manufacture of nanocomposite PVA/ZnS is a sol-gel method. PVA weighed 20 g dissolved in 200 mL of distilled water and stirred using a magnetic stirrer while heated with a hot plate until late at all. ZnS nanoparticles weighed 0.2 g (1% weight) dissolved in 200 mL of distilled water and stirred until dissolved. Both of these solutions incorporated into the three-neck 3 1234567890 Innovation in Polymer Science and Technology 2016 (IPST 2016) IOP Publishing IOP Conf. Series: Materials Science and Engineering 223 (2017) 012027 doi:10.1088/1757-899X/223/1/012027 flask and stirred using a magnetic stirrer with a speed of 500 rpm while heated with a hot plate to a temperature of 80oC. After distilled water evaporates and thickens like a gel solution, inserted into the glass mold that has been formed and allowed to dry and harden. The procedure is repeated with variations PVA:ZnS at ratio (100:0)%, (99:1)%, (98:2)%, (97:3)%, and (96:4)%. According to Mikrajuddin (2008) [15], percentage weight of nanoparticulate inserted very small about 0.5% to 5%. Samples were formed according to the sample test, tensile test to ISO 527-2 and DSC test with ASTM D3418-03. SEM used to determine the morphology of the sample surface. 3. Results and Discussion Nanocomposite PVA/ZnS have been synthesized by sol-gel method. The product was formed in ISO 527-2 tensile testing with a length of 26 mm, 4 mm wide and 1.124 mm thickness. Every sample was made 5 pieces for each variation to obtain more accurate results and the resluts of measurements be averaged. Sample with only PVA seem translucent and transparent. Sample with a mixture of PVA and variations ZnS nanoparticles white colored slightly darker than the sample with only PVA. With only 1% mixture of ZnS nanoparticles are visible differences in terms of color samples, as well as for samples with a mixture of PVA and ZnS nanoparticles (98:2)%, (97:3)% and (96:4)% more white color and not transparent, this is due to the amount of nanoparticles are mixed more. Tensile test was performed to determine the tensile strength, elongation at break, strain and Young's modulus. These samples were tested by tensile test equipment

UCT with 5 variations mixture of PVA and ZnS nanoparticles. Recording the results of tensile tests nanocomposite PVA/ZnS nanoparticles to a mixture of PVA and ZnS. Figure 1 shown Young's modulus represent of most reckoned by mechanic properties because it representing comparison of stress and strain, this properties show the delaying of a material. The Young's modulus of mixture PVA and nanoparticle ZnS at 98:2 % wt. The addition of 2% ZnS will multiply the number of cross-linking between the molecular chains that affect mechanical properties. It shown the largest Young's modulus obtained on the composition of PVA: ZnS (98:2)% which is 190.73 MPa. So the composition of the obtained ZnS 2% greater stress and smaller strain. PVA with a little amount of crosslinking will be relatively soft and flexible with the amount of the PVA crosslinking more. A reduction in compressive strength with the addition of PVA was also reported in previous research studies [16]. 4 1234567890 Innovation in Polymer Science and Technology 2016 (IPST 2016) IOP Publishing IOP Conf. Series: Materials Science and Engineering 223 (2017) 012027 doi:10.1088/1757-899X/223/1/012027 Figure 1. Bar charts Young's modulus of the composition of ZnS nanoparticles. Thermal tests performed using diferential scanning calorimetry (DSC) to determine the melting point of the nanocomposite PVA/ZnS. DSC analysis with a mass of 6.8 mg using nitrogen gas with a flow rate of 20 mL / min and the heating rate was 20 'C/min. For the nanocomposite sample variation between PVA and ZnS nanoparticle mixture (0,1,2,3,4)% obtained thermogram results as Figure 2. It can be seen that in general the addition of nanoparticles gives rise from the melting point, but in the nanocomposite mixture of PVA/ZnS (98:2)% and (96:4) % are down. It can be caused by uneven mixture of nanoparticles and also the process of making that less than the maximum, in terms of mixing and drying. Greatest value of the melting temperature of the mixture contained in the nanocomposite PVA/ZnS in composition (97:3) % is 224.39 C. 210 215 220 225 230 235 240 245 250 20 25 30 35 40 45 50 PVA:ZnS=(100:0)% PVA:ZnS=(96:4)% PVA:ZnS=(97:3)% PVA:ZnS=(98:2)% PVA:ZnS=(99:1)% Heat Flow (mW) Temperature 0C Figure 2. DSC thermograms of PVA/ZnS nanocomposite with ZnS composition of 0, 1, 2, 3, and 4% 0 1 2 3 4 5 0 20 40 60 80 100 120 140 160 180 200 220 240 composition ZnS 4% composition ZnS 3% composition ZnS 2% composition ZnS 1% Composition ZnS 0% 87,03 120,52 190,73 106,3 153,84 Young's Modulus (MPa) Composition of ZnS Nanoparticle(%) 5 1234567890 Innovation in Polymer Science and Technology 2016 (IPST 2016) IOP Publishing IOP Conf. Series: Materials Science and Engineering 223 (2017) 012027 doi:10.1088/1757-899X/223/1/012027 (a) (b) (c) (d) (e) Figure 3. SEM morphology of PVA/ZnS nanocomposite with (a) 0%, (b) 1%, (c) 2%, (d) 3%, and (e) 4% ZnS in x1000 magnification. The result of Figure 3c is better than other variations mixture made. The morphology of the surface has a uniform and homogeneous mixture. The results of mechanical tests also obtain better mechanical properties in this mixture. It is seen from Figure 3 that PVA/ZnS nanocomposite hydrogel with 2% ZnS contains lot of micro holes and the ZnS powder particles are uniformly distributed in the PVA matrix and well packed by the hydrogel. However, many micro holes minimize and even close because of the lower water content. For PVA/ZnS nanocomposite hydrogel with 2% ZnS, there exist some ZnS nanoparticle agglomerates. In other variations mixture have agglomeration of ZnS at some point. This occurs due to less than perfect stirring and heating unevenly. SEM results also linear with respect to the results of testing mechanical properties. This suggest the addition of nanoparticles causes an increase in its mechanical properties PVA/ZnS nanocomposite hydrogel with 2% ZnS contains). Although in some samples decreased upon the addition of nanoparticles, is seen on the addition of the composition of ZnS 1, 3, and 4%. This occurs due to the increase in areas that do not interact, so that the material is not increased mechanical strength [17]. 6 1234567890 Innovation in Polymer Science and Technology 2016 (IPST 2016) IOP Publishing IOP Conf. Series: Materials Science and Engineering 223 (2017) 012027 doi:10.1088/1757-899X/223/1/012027 4. Conclusion Based on the results of research and discussion in the manufacture of nanocomposite Polyvinyl Alcohol (PVA) with a mixture of PVA and the composition of ZnS nanoparticles of 0, 1, 2, 3 and 4% is concluded as follows: The results mechanical tests of PVA/ZnS nanocomposite to a mixture of PVA and the composition ZnS (98:2)% gained an average of the largest Young's modulus is 190.73 MPa. In this mixture also obtained morphology uniform and homogeneous. Thermal properties is better occur in the composition (97:3)%, obtained by the melting temperature of 224.39 'C with enthalpy 15.1036 J/g and the heat of 93.642 mJ. References [1] Mancini L H, dan Esposito C L 2008 Nanocomposites : Preparation, Properties and Performance, Nova Science Publisher, Inc, New York. [2] Kumar A P et al 2009 Progres in Polym Sci. 34 479-515. [3] Ashby et al 1980 Engineering Materials, An Introduction to their Properties and Applications, edited by R.J. Brook, Pergamon Press, New York. 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