

Certificate

Presented to

Eva Marlina Ginting

as

Speaker

at INNOVATION IN POLYMER SCIENCE AND TECHNOLOGY 2011
(IPST2011)

Sanur Paradise Plaza Hotel, Bali, Indonesia
November 28 - December 1, 2011



Asian Polymer Association (APA) &
Indonesian Polymer Association (HPI)

Chairman of Conference and
President of Indonesian Polymer Association,



Dr. Sunit Hendrana

Asian Polymer Association (APA) &
Indonesian Polymer Association (HPI)

President of Asian Polymer Association,

Prof. Bhuvanesh Gupta

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UNIVERSITY

Innovation in Polymer Science and Technology 2011 (IPST2011)
Conference, Workshop & Exhibition
Denpasar, Bali – Indonesia, November 28 – December 1, 2011

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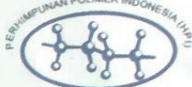
PROGRAM & ABSTRACT BOOK

INNOVATION IN POLYMER SCIENCE AND TECHNOLOGY 2011 (IPST2011)

November 28 - December 1, 2011, Bali, Indonesia

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The Indonesian Polymer Association (HPI) & the Asian Polymer Association (APA)

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INDONESIAN POLYMER ASSOCIATION

Message from the President, Indonesian Polymer Association

The International Conference on Innovation in Polymer Science and Technology 2011 (IPST 2011) is the biggest event which is organized by professional organization, i.e., Indonesian Polymer Association. The conference attracts participants from 16 countries of 4 continents. They have different cultural background. Thus, if there are something unpleasant occurring in this conference we ask for your apology. We try our best to perform the conference according to international standards.

The conference gives space for participants to build constructive relationship and widen network.

We hope all participants can take advantages from this conference, having valuable and nice time within warm hospitality in Bali.

Best Regards,
President,

Dr. Sunit Hendrana



ASIAN POLYMER ASSOCIATION



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Web site: www.apa-asia.org

Message from the President, Indonesian Polymer Association

Asian Polymer Association (APA) was founded in April 2007 at the premises of Indian Institute of Technology, New Delhi. It is a multinational society involving members from different countries. The vision of APA is to bring together Asian science & technology to the forefront of global arena so that a proper network of scientists and technologists across the world may be established. Within a short span of time, the membership of the society has spread over different countries. APA is going to be a major platform for inter action among the people from different disciplines of polymers.

It is highly interesting that APA together with HPI is organizing its very International Conference on Innovation in Polymer Science & Technology (IPST-2011) at Bali, Indonesia on November 28-December 1, 2011. The choice of the venue for the event is very much fascinating and would offer beautiful time for our delegates over the period of the Congress. This is going to be highly interactive event where delegates from different part of the world will be participating in the form of Plenary, Keynote, Invited, Oral and Poster presentations covering various areas of polymer science. This conference would certainly be a vision forward for the scientific community and would be viewed in a larger perspective of focal point of discussion among the delegates. On behalf of APA, I welcome the participants at Bali and wish IPST-2011 to be a high profile and visionary event for all the delegates.

Bhuvanesh Gupta

INTRODUCTION

International conference on **Innovation of Polymer Science and Technology (IPST-2011)** supported by Asian Polymer Association (APA) is organized by Indonesian Polymer Association (HPI). The conference will provide a platform for academic exchange for polymer scientists and practitioners from all over the world through invited talks and distinguish lectures series. Following APA 2008 and APA-2009 international meetings, the IPST-2011 held on November 28th-December 1st, 2011 in Bali, Indonesia also provide workshop and exhibition.

SCIENTIFIC TOPIC:

1. Nanostructure Polymer and Composites
2. Polymer Technology in New and Renewable Energy
3. Fibre and Fibrous Polymeric Materials
4. Smart Material and Specialty Polymer
5. Polymer Blend and Polymer Physics
6. Advanced Synthetic Polymerization and Its Application
7. Green/Sustainable Polymer and Biopolymer
8. Polymer for Medical and Pharmacy Application
9. Polymer Functionalization

ORGANIZATION

Chairman: Sunit Hendrana, Indonesia

Vice-Chairman: Lies A. Wisojodharmo, Indonesia

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 Prof. Valter Castelvetro, University of Pisa, Italy
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 A. Misra IV, India
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VENUE

WORKSHOP

UDAYANA UNIVERSITY
 Department of Chemistry, Faculty of Mathematics and Natural Sciences
 Jl. Kampus Bukit Jimbaran, Badung, Bali, INDONESIA
 Phone +62-361-701954, 703137

CONFERENCE & EXHIBITIONS

SANUR PARADISE PLAZA HOTEL
 Jl. Hang Tuah 46, Sanur, Bali, INDONESIA
 Phone +62-361-281781, Fax. +62-361-289166

Plenary Session	Griya Agung Ballroom
Parallel Session	Tabanan Room, Amlapura Room, Bangli Room, Griya Agung Ballroom
Microsymposium	Legian Room
Poster Session	Pre Function Area
Registration desk (Nov 28)	Lobby
Registration desk (Nov 29)	Pre Function Area
Banquet and dinner	Griya Agung Ballroom
Coffee Break	Pre Function Area
Lunch	Sanur Harum

Day 2 – November 29, 2011

Time	Program
08.00-09.00	Registration
09.00-10.10	Opening Ceremony Speech from Committee Chairman & President of HPI, Speech from President of APA & Announcement of APA Award, Speech from State Ministry of Research and Technology, Speech and Opening Remarks from President of Udayana University, Photo Session <i>Griya Agung Ballroom</i>
10.10-10.30	COFFEE BREAK <i>Pre Function Area</i>
10.30-11.15	J. Hilborn - Polymers for Tissue Regeneration Chairman: B. Gupta <i>Griya Agung Ballroom</i>
11.15-12.00	D. Letourneur - Three Dimensional Porous Scaffolds Made of Biodegradable Polymers for Cardiovascular Tissue Engineering Chairman: J. Forsythe <i>Griya Agung Ballroom</i>
12.00-12.45	D.J. Liaw - New Functional Polymers for Optoelectronic Applications Chairman: S. Hendrana <i>Griya Agung Ballroom</i>
12.45-14.00	LUNCH BREAK <i>Sanur Harum</i>
14.00-15.40	Parallel Session 1 <i>Griya Agung Ballroom, Tabanan Room, Amlapura Room, Bangli Room</i>
15.40-16.40	Microsymposium Polymer for Medical and Pharmacy Applications <i>Legian Room</i>
15.40-16.40	POSTER SESSION A & COFFEE BREAK <i>Pre Function Area</i>

Day 3 - November 30, 2011

Time	Program
08.00-09.40	Parallel Session 2 <i>Griya Agung Ballroom, Tabanan Room, Amlapura Room, Bangli Room</i>
09.40-10.10	M. Meyer – Wood Plastic Composite (WPC) : A Fascinating Building Material Investigated by Advanced Thermal Analysis Techniques Chairman: Y. Baimark <i>Griya Agung Ballroom</i>
10.10-10.30	COFFEE BREAK <i>Pre Function Area</i>
10.30-11.15	K. Mortensen - The Nano-scale Structure of Polymer Amphiphilic Systems: Tailored New Phases and Applications as Smart Materials Chairman: I. Potemkin <i>Griya Agung Ballroom</i>
11.15-12.00	A. Suzuki - Microstructure and Swelling Properties of Poly(vinyl alcohol) Gels Prepared by Conventional and Cast-drying Methods Chairman: A.K. Gosh <i>Griya Agung Ballroom</i>
12.00-12.45	A.K. Bhowmick - Dispersion of Nanofillers in Polymers: Methods and Theories Chairman: S. Hirose <i>Griya Agung Ballroom</i>
12.45-14.00	LUNCH BREAK <i>Sanur Harum</i>
14.00-15.40	Parallel Session 3 <i>Griya Agung Ballroom, Tabanan Room, Amlapura Room, Bangli Room</i>
15.40-16.40	POSTER SESSION B & COFFEE BREAK <i>Pre Function Area</i>
16.40-18.20	Parallel Session 4 <i>Legian Room, Tabanan Room, Amlapura Room, Bangli Room</i>
18.20-19.00	Free Time
19.00-21.00	BANQUET & DINNER Announcement of HPI Award <i>Griya Agung Ballroom</i>

Day 4 - December 1, 2011

Time	Program
8.00-9.40	Parallel Session 5 <i>Griya Agung Ballroom, Tabanan Room, Amlapura Room, Bangli Room</i>
9.40-10.10	A. W. Saptorahardjo - Enviplast for Greener Future Chairman: M.M. Nasef <i>Griya Agung Ballroom</i>
10.10-10.30	COFFEE BREAK <i>Pre Function Area</i>
10.30-11.15	S.S. Achmadi - Polybrominated Diphenyl Ethers as Flame Retardant in Plastics: Case in Indonesia Chairman: C. Nah <i>Griya Agung Ballroom</i>
11.15-12.00	W.H. Starnes Jr. - Poly(vinyl chloride) Degradation and Stabilization: Recent Technical Progress Chairman: J. Nasiri <i>Griya Agung Ballroom</i>
12.00-12.45	Closing Ceremony Announcement of Poster & Presentation Awards <i>Griya Agung Ballroom</i>
12.45-14.00	LUNCH BREAK <i>Sanur Harum</i>

Note:

- Odd number for last two digit in poster code should be presented on November 29, 2011
- Even number for last two digit in poster code should be presented on November 30, 2011
- PS: Poster Presentation
- OR: Oral Presentation
- IS: Invited Speaker
- KS: Keynote Speaker
- PL: Plenary Lecture

PARALLEL SESSION 1 – Tuesday, November 29, 2011

	Time	Code	Speakers	Title	Chairman	
BALLROOM	14.00		K. Oyaizu	Polymers for Energy Storage Materials	E.L. Dewi	
	14.30	IS1-01		Development of Membranes by Radiation Grafting for Fuel Cells		
	14.50	OP1-01	E.L. Dewi	Dye Sensitized Solar Cell Performances Using Nafion As Polyelectrolyte Material	O.E. Philippova	
	15.05	OP1-02	I. Widiastuti	Performance of Bio-Based Polymer in Environment Typical for Automotive Application		
	15.20	OP1-03	S. Handayani	Influence Of Composite Electrolyte Membrane For Hydrogen Fueled Proton Exchange Membrane Fuel Cells		

TABANAN	14.00	KS1-02	M. M. Nasef	Advances in the Development of Functional Polymers using Radiation Induced Emulsion Polymerization	R. Mehta	R.E. Sardjono
	14.30	IS1-02	K. Kumari	Controlled Fertilizer Release Through Methylcellulose/Starch Blended Films	S. Tsubaki	
	14.50	OP1-04	D. Bachtiar	The Effect of Irradiation Beam on Tensile Properties of Short Sugar Palm Fibre Reinforced High Impact Polystyrene Composites		
	15.05	OP1-05	S. Danu	Degradation of Kapur (Dryobalanops spp.) Wood by Electron Beam Irradiation		
	15.20	OP1-06	A. Listyarini	Mechanical Properties of Polyethylene Blended with Biodegradable Poly(butylenes succinate)		

AMLAPURA	14.00	KS1-03	A.Z. Abidin	Polymers for Enhanced Oil Recovery Technology	B.S. Kaith	Zaimahwati
	14.30	IS1-03	S.N. Gan	Environmental Friendly Polyurethane Foams from Palm Oil Derivatives		
	14.50	OP1-07	W. Waskitoaji	Synthesis of Plasticizers Derived from Palm Oil and Their Application in Polyvinyl Chloride	S.M. Sapuan	
	15.05	OP1-08	Z. Leman	Mechanical Properties of Impregnated Sugar Palm Fibre-Reinforced Unsaturated Polyester Composite		
	15.20	OP1-09	Bahrudin	Morphology and Mechanical Properties of Fly Ash Reinforced Dynamically Vulcanized Natural Rubber/Polypropylene Blend		

BANGLI	14.00	KS1-04	A.K.N. Sharma	Polyurethane Nanocomposites from Biobased materials: An Alternative to Traditional Composites	B. Wirjosentono	E.S. Iriani
	14.30	IS1-04	H. Judawisastra	The Effects of Demineralization Process on Diameter, Tensile Properties and Biodegradation of Chitosan Fiber		
	14.50	OP1-10	V. Ali	High Density Structural Rigid Polyurethane Foam from Castor Oil based Polyol	M. Karina	
	15.05	OP1-11	N. Mulyono	Novel Biodegradable Plastic Thin Sheet Derived from Dammar as Natural Polymer		
	15.20	OP1-12	Y. Baimark	Biodegradable MPEG-b-PDLL/MPEG-b-PCL Blend Nanoparticles Prepared by an Nano-precipitation Method		

PARALLEL SESSION 3 – Wednesday, November 30, 2011

	Time	Code	Speakers	Title	Chairman	Secretary
BALLROOM	14.00	KS3-01	J. Forsythe	Rewiring The Brain Using Novel Biomaterials	D. S. Lee	Bahrain
	14.30	IS3-01	M. Sadeghi	Synthesis of Novel Polysaccharide-based Superabsorbent Hydrogels via Graft Copolymerization of Vinyl Monomers onto Kappa-carrageenan		
	14.50	OP3-01	Erizal	Radiation Synthesis of Superabsorbent Poly(acrylamide-co-acrylic acid)-sodium Alginate Hydrogels	W. Taweepreda	
	15.05	OP3-02	N. Seko	Application of Water Decontamination by Anion Adsorbent Grafted onto Biodegradable Nonwoven Fabrics		
	15.20	OP3-03	R. Daik	Synthesis and Thermal Conductivity of Surfactant-Doped Polypyrrole / Chloroprene Rubber Nanocomposites		

TABANAN	14.00	KS3-02	S. Hendrana	Supramolecular Structure for Polymer Electrolyte Membranes Based on Sulfonated Polystyrene	J. Manuel	K. Muchlis
	14.30	IS3-02	O.E. Philippova	Nanogels of Constant Size in Dilute Solutions of Associating Polyelectrolyte		
	14.50	OP3-04	S. Mulijani	Enhanced Performance of Asymmetric Polystyrene Membrane by Incorporation of Pluronic F127 and Its Application for Pervaporation Separation	A. Ahmad	
	15.05	OP3-05	Z. Muchtar	Synthesis of Hyperbranched Nanoscopic Polybutadiene by Successive "graft from" and "graft onto" Copolymerization		
	15.20	OP3-06	L.O.A.N. Ramadhan	Synthesis and Characterization of Polyelectrolyte Complex		

AMLAPURA	14.00		D.K. Tripathy	Rubber Nanocomposites Based on Nanofillers	V. Ali	D. Ardilla
	14.30	IS3-03	S.M. Sapuan	Mechanical Properties of Sugar Palm Fibre Reinforced High Impact Polystyrene Composites		
	14.50	OP3-07	C. Parida	Mechanical Analysis of Bio-nanocomposite Prepared from Luffa Cylindrica	H. Judawisastra	
	15.05	OP3-08	D. Khastgir	Development of Natural Rubber-Fibrous Nano Clay Attapulgite Composites: The Effect of Chemical Treatment of Filler on Mechanical & Dynamic Mechanical Properties of		
	15.20	OP3-09	N. Othman	Thermal Properties and Flame Retardancy of Zeolite Filled Ethylene Vinyl Acetate Composites		

BANGIL	14.00	KS3-04	I.C. Kwon	Lighting Up Polymers for Molecular Imaging	G.R. Deen	M. Anggaravidya
	14.30	IS3-04	J. H. Ahn	Polymer Electrolyte Based on Electrospun P(VdF-HFP) Nanofibrous Membranes with Polymer Plasticizers for Lithium Batteries		
	14.50	OP3-10	M. Taha	The Effect of MES, MOPS, and MOPSO Buffers on the Conformation of the Ubiquitous "Smart" Polymer PNIPAM	A.Z. Abidin	
	15.05	OP3-11	S. Suparno	Chemical Reaction Detection by Piezoelectric Film of Poly (vinylidene fluoride)		
	15.20	OP3-12	P.S. Rudati	The Preparation of Insoluble Layer Based on Cationic Induced Ring Opening Polymerisation of Oxetane-Derivatized Triphenylaminodimer (TPD) for Organic Electronics		

PARALLEL SESSION 4 – Wednesday, November 30, 2011

	Time	Code	Speakers	Title	Chairman	Secretary
LEGIAN	16.40	KS4-01		Innovative Polymer Scaffolds for Bone Tissue Engineering	B. Gupta	M.Z. Siregar
	17.10	IS4-01	K. Isnihara	Success Development of Biocompatible Polymers Designed by Nature Original Inspiration		
	17.30	OP4-01	M. Nauri	Poly(ϵ -caprolactone)/Nanoclay Nanofiber Mat as A Novel Scaffold for Tissue Engineering	B. L. Deopura	
	17.45	OP4-02	L. Hardiningsih	Biological Evaluation of Irradiated Cellulose Microbial (CM) Membrane for Application in Guided Bone Regeneration		
	18.00	OP4-03	Saiful	Mixed Matrix Polymeric Membranes for Extracorporeal Blood Purification		
TABANAN	16.40	KS4-02	I. I. Potemkin	Amphiphilic Copolymers for Efficient Stabilization of Colloidal Particles	K. Yamamoto	P. S. Rudati
	17.10	IS4-02	J. Dey	In Vitro Evaluation of Amphiphilic Copolymers Loaded with Camptothecin	M. Kaavessina	
	17.30	OP4-04	A. Haryono	Preparation of Poly(methyl methacrylate) Nanoparticles and their stabilization in Emulsion System		
	17.45	OP4-05	Mujamilah	An Effort on Homogenizing Size Distribution of Magnetic Nanosphere (MNP) Base on Iron Oxide Nanoparticle Coated by Poly-Lactic Acids (PLA)		
	18.00	OP4-06	S.K. Dhawan	Synthesis and Designing of Nano Ferromagnetic Conducting Polymer Composites for Their Applications in EMI Shielding in X-Band and Ku-Band		

AMILAPURA	16.40		A.K. Gupta	Effect of Blending on PP Crystallization	N. Seko	
	17.10	IS4-03	M. Joshi	Hybrid Nanocomposite Coatings on Textiles for Enhanced Functionality		
	17.30	OP4-07	W. Taweeprada	In Situ Coating of Natural Rubber Film with Poly(vinyl chloride) Resin	R.D. Kulkarni	
	17.45	OP4-08	A.M. Nemade	Kinetics and Thermodynamics of Hydrolytic Depolymerization of Polyurethane (Foam) and Polyamide Waste at Higher Temperature by Using High-Pressure Autoclave		
	18.00	OP4-09	H. K. Mullani	The Application of Plasma Technology on Textile Substrate		
BANGLI	16.40	KS4-04	D. S. Lee	Design/Synthesis of Stimuli-Responsive Block Copolymers for Biomedical Application	R. Daik	M. Tjeng
	17.10	IS4-04	K. Subramanian	Isophorone Diisocyanate Modified Gelatin for Controlled Release of Active Pharmaceuticals	G.S. Chauhan	
	17.30	OP4-10	Y. Setiyorini	The Influence of Temperature and Drug Concentrations Prednisolone in NIPAAm Copolymer		
	17.45	OP4-11	J. Sibarani	Micropatterned Bioactive Layer on Nonbiofouling Surface for Highly S/N Immunoassay-based Biosensors		
	18.00	OP4-12	D. Mohamad	The Influence of Filler Concentration, Filler Distribution and Degree of Conversion on Properties of Restorative Dental Composites		

PARALLEL SESSION 5 – Thursday, December 1, 2011

	Time	Code	Speakers	Title	Chairman	Secretary
BALLROOM	8.00		B. Wirjosejono	Bacterial Cellulose-Based Biopolymers and Green Nanocomposites	K. Kumari	J.A. Karo-karo
	8.30	IS5-01	G.S. Chauhan	Structure-Property Relationship in Antimicrobial Polymers Synthesized by Chemoenzymatic Route		
	8.50	OP5-01	D. Darwis	In-vitro Degradation Behavior of Irradiated Cellulose Microbial Membrane	N. Mulyono	
	9.05	OP5-02	Y.S. Hardi	Interfacial Polymer Modification for Antibacterial Coatings of Small Molecules of Serrulatane		
	9.20	OP5-03	M. Karina	Alteration of Bacterial Cellulose Properties by Diacetylglycerol		

TABANAN	8.00	KS5-02	S. Hirose	Novel Epoxy Resins Derived from Biomass Components	N. Bahar	S. Handayani
	8.30	IS5-02	M. Chalid	A Novel Route for Green Polymer Precursors from Biomass-Based Levulinic Acid Through Facial Synthesis		
	8.50	OP5-04	E. S. Iriani	Utilization of Corn Hominy as New Sources Material for Thermoplastic Starch Production	S.N. Gan	
	9.05	OP5-05	Y. Setiawan	Effect Of Iso-Propanol Reuse Of Carboxymethylcellulose (CMC) Making On Cmc Quality		
	9.20	OP5-06	E.A. Rahim	Eugenol-Based Polyacetylenes: Plastic-Electronics Material from Environmentally Friendly Inexpensive Natural Resource		

AMILAPURA	8.00	KS5-03	B. Gupta	Development of Chitosan Based Composite Hydrogels as Novel Wound Dressings	J. Amédée	N.M. Suaniti
	8.30	IS5-03	R.D. Kulkarni	Synthesis and Reaction Engineering of Multifunctional Acrylates and Formulation and Characterisation of UV Cure Epoxy Acrylate Clear Coatings		
	8.50	OP5-07	N.G. Shimpi	Influence of Poly(methyl methacrylate) Nanoparticles (nPMMA) on PP-EPDM Blend	H.Md. Akil	
	9.05	OP5-08	M.M. Kamal	Influence of Zinc Oxide Nano Particle on Sulphur Vulcanization Rubber Compounds		
	9.20	OP5-09	N.S. Suharty	Flammability, Biodegradability and Mechanical Properties of Bio-Composites Waste Polypropylene/Kenaf Fibre Containing nano CaCO ₃ and Diamonium Phosfat (DAP)		

BANGIL	8.00	KS5-04	J.P. Wu	Preparation of Micron-size Mono-dispersed Polymer Particles and Their Application to Optical Films	S. H. Chiu	S. Aprilia
	8.30	IS5-04	P.H. Parsania	Synthesis and Physico-chemical Study of Novel Epoxy Resins and Their Composites		
	8.50	OP5-10	A. P. Irawan	Mechanical Characteristics Rattan Fiber Reinforced Epoxy Composites (RECO) as Above Knee Socket Prosthesis Materials	Z. Leman	
	9.05	OP5-11	S. Mujiati	Effect of the Amount of Hydrogen on the Polymerization of Propylene Using Bench Scale Polymerization Apparatus		
	9.20	OP5-12	H. Muin	Biodegradable Plastic from result Oxidized LLDPE (Linear Low Density Polyethylene)/Starch and Clay Composites		

**INFLUENCE OF NATURAL NANO ZEOLITE FILLER in
POLYPROPYLENE /PPMA BLENDS ON THERMAL AND
X- RAY DIFFRACTION (XRD) PROPERTIES**



By

Eva Marlina Ginting^{1*}, Nurdin Bukit²

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Department of Physics,

**Faculty of Mathematics and Natural Sciences
State University of Medan
2011**

INFLUENCE OF NATURAL NANO ZEOLITE FILLER in POLYPROPYLENE /PPMA BLENDS ON THERMAL AND X- RAY DIFFRACTION (XRD) PROPERTIES

Eva Marlina Ginting^{1*}, Nurdin Bukit²

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Abstract

This research was conducted for the manufacture of thermoplastic composite mixture polypropylene (PP) and natural zeolite from North Tapanuli area North Sumatra Indonesian. The natural zeolite was used to prepare nanometer size of zeolite and then mixed with polypropylene - maleic anhydride (PPMA) as a compatibilizer. Methods of making nano-composites was made by mixing a calcination and without calcination of natural nano-zeolites temperature of 180 °C and 60 rpm. The composition of natural nanoparticle zeolite were 0, 2, 4, 6%-wt, and PPMA 5% (parts per hundred of the blend). The Composite analysis and X-ray diffraction (XRD) for crystal structure analysis. From DSC results, the glass temperature (T_g) for the composition of calcinated nanoparticle zeolite 0 and 2%-wt were -51.52 °C and -53.19 °C, respectively. At the same nanoparticle zeolite and composition, the melting point (T_m) also increased from 168.66 °C to 171.55 °C. Compared to non calcinated nanoparticle zeolite in 2%-wt composition the melting point slightly decreased into 170.80 °C. From the result of X-ray data indicated that the d -spacing of polymer polypropylene increased and showed the intercalation between polymers with the filler. The d -spacing of 0, 2%-wt, 4 %-wt, and 6 %-wt calcined natural nanoparticle calcined nanoparticle zeolite, the d -spacing was Å and 5.2677 Å, 5.3044 Å, 5, 5,2918 Å, , 5,2606 Å respectively. While without calcined nanoparticle zeolite were 5,2730 Å, 5,2730 Å and, 5,3170 Å for respectively 2% -wt, 4 %-wt and 6%-wt composition.

Key words: PP, PPMA, natural nano zeolite, thermal, XRD

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INTRODUCTION

Zeolites are crystalline hydrated aluminosilicates that contain alkali or alkaline earth cations in the framework of three dimensions, among them are stable at high temperatures, resistant to organic solvents and chemicals as well as its hard making it more resistant to mechanical stress is quite high when compared with organic ingredients and polymers. Zeolites have a very regular crystalline form with cavities that are interconnected in all directions leading to the zeolite surface area so large that it is best used as adsorbent¹. The addition of zeolite materials as a filler in polypropylene matrix can increase the Young's modulus and impact strength².

Zeolites have hydrophilic properties, the material is generally incompatible with most polymer materials, therefore, must be chemically modified to make the surface more hydrophobic, it is necessary for a material that is compatible with the matrix polymer Polypropylene (PP)³. Polymer composite is a composite consisting of a matrix (matrix is a material that binds the basic building blocks of composite filler with a chemical bonding does not occur) in the form of a polymer and a filler material (filler) of various types of materials so that the composite material has the properties of alloys of the constituent material properties⁴.

This results, the addition of 10-30% in the bentonite can improve the mechanical properties of polypropylene and thermal properties, as well as with PP MA, then the impact nature of better than bentonite without substance Compatibilizer⁵.

In order to overcome the problem of this mismatch, the main role of compatibilization can add adhesion. The addition of adhesion binder goal to connect the bond between two substrates via the reduction of interfacial pressure, when used for bonding adhesion between two polymer materials that are not compatible, this is called compatibilizer. Most of the fillers used are polar in nature while the polypropylene is not a polar polymer. Weak adhesion between filler surface and polymer matrix can be solved in a way to solve a collection of liquefied polymer from the filler particles. One method often used to overcome this problem is to treat the filler with some substances, such as stearic acid, which will make the surface more hydrophilic. Another additive, such as Silanes, zirconates and titan. This material reacts with the filler surface and interacts with the polymer material and can improve the adhesion between the filler particles and polymer matrix⁶.

EXPERIMENTAL

MATERIAS.

The main material used in this study is the natural zeolite in the form of chunks of sub Pahae North Tapanuli district of North Sumatra, Polypropylene (PP), PPMA,

Instruments

1. DSC
2. X-ray diffracton (XRD).
3. Furnece
4. Laboplastomel internal mixer with a volume of 60 cc Model 30 R150
5. Hot press hot and cold

The processing of polypropylene.

At this stage the process of making composites Polymer Physics Laboratory mixing done Cisitua Road Sangkuriang LIPI Bandung. The mix is done in an internal mixer with a volume laboplastomil 30R150 Model 60 cc (the maximum amount of 50 grams of total composition), with the mixing process as shown in table 2 The process is conducted at a temperature of 180 ° C and rotor speed 60 rpm for 10 minutes for the sample PP,, nano natural zeolite , PPMA, with the sequence as shown in Table 1.

Table 1. The time sequence of entry of materials into the internal mixer for The mixture of PP with compatibeliser PPMA and natural zeolite nano fillers.

Time (menite)	Operation	Operation
3	The melt PP	The melt PP
4	Nano natural zeolite caltination	Nano natural zeolite un caltination
3	PP MA	PP MA
10	end	end

Table.2. The mixture composition of materials on the Internal Mixer PP, PP-g-MA, Nano purification of natural zeolite

Sampel	S8 (%wt)	S9 (%wt)	S10 (%wt)	S11 (%wt)
Nano natural Zeoliet with caltination	0	2	4	6
PPMA	5	5	5	5
PP	95	93	91	89



Table 3. Composisi mixture in an internal mixer PP, PP-g-MA, the natural zeolite nano without purification results

Sampel	S12(%wt)	S13 (%wt)	S14(%wt)
Nano natural Zeolite un caltination	2	4	6
PP MA	5	5	5
PP	93	91	89

Characterization

Thermal Analysis.

Results of analysis by DSC Mettler Toledo type 821 to ASTM D 3418-03. The sample is weighed mass of about 10 -12 mg and put in a crucible 40 mL analysis done with the program temperature heating-cooling-heating is $30^{\circ}\text{C} \rightarrow 75^{\circ}\text{C}$, $160^{\circ}\text{C} \rightarrow 270^{\circ}\text{C}$. $15^{\circ}\text{C}/\text{min}$ heating rate $10^{\circ}\text{C}/\text{min}$ with a gas with nitrogen gas with flow rate $50\text{ ml}/\text{min}$.

The test result is a DSC thermogram curves that can be used to determine the glass transition temperature and melting temperature.

XRD

Nano Composites of natural zeolite calcination and without calcination results in the characterization using X-Ray diffractometry (X-RD) where temperatures used were room temperature using a Shimadzu XRD. With voltage 40 kV and current of 30 mA using a nickel to filter Cu K radiation α where the scanning rate used was from $2^{\circ}/\text{min}$ at a distance of $2\theta = 2 - 65^{\circ}$

RESULTS AND DISCUSSION

1. The Thermal analysis Composite Thermoplastic Blends PP/ PPMA/ nano natural zeolite Calcination.

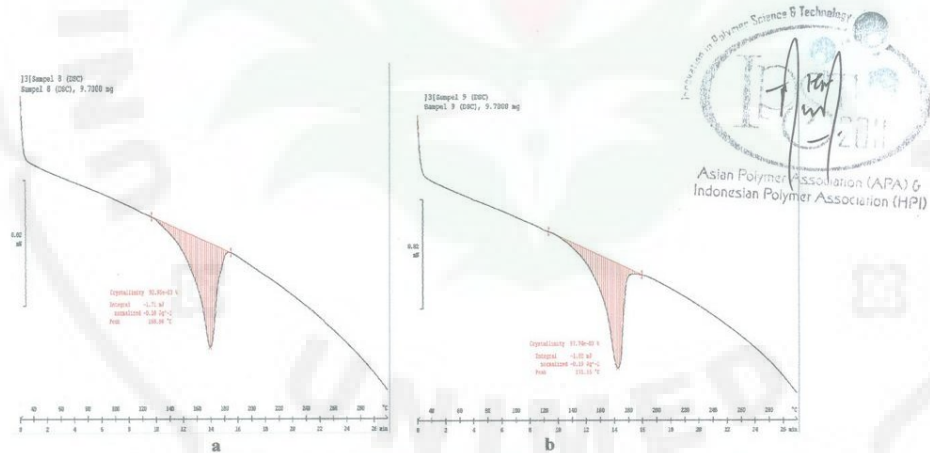


Figure 1. Thermogram DSC , a, blend PP/PPMA b, blend PP/PPMA /2% natural nano zeolite calcination

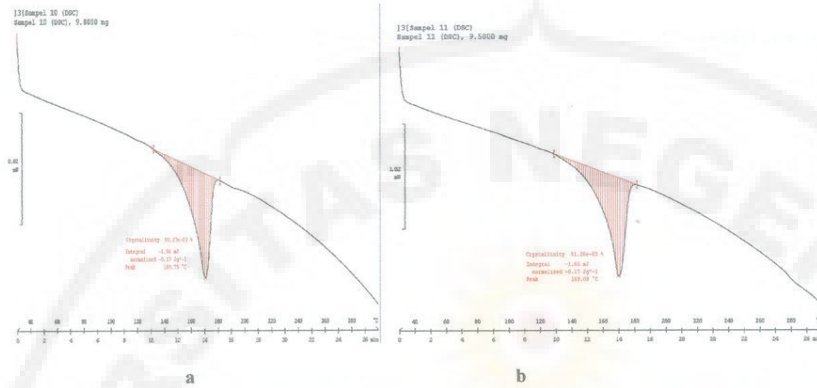


Figure 2. Thermogram DSC blend PP/PPMA /natural nano zeolite calcination a, 4 % , b, 6 %

Table 4. . Melting Temperature Blends PP/PPMA/ nano natural zeolite Calcination

Compositi on nano zeolite Calculation (%)	Temperature melt Tm (°C)	Crystallity (X_{kom}) (%)	ΔH (J/g)
PP	170,01	$77,77e^{-30}$	-0,15
0	168,66	92,95	-0,18
2	171,55	$97,74 e^{-30}$	-0,19
4	169,75	$90,27 e^{-30}$	-0,17
6	169,09	$91,26 e^{-30}$	-0,17

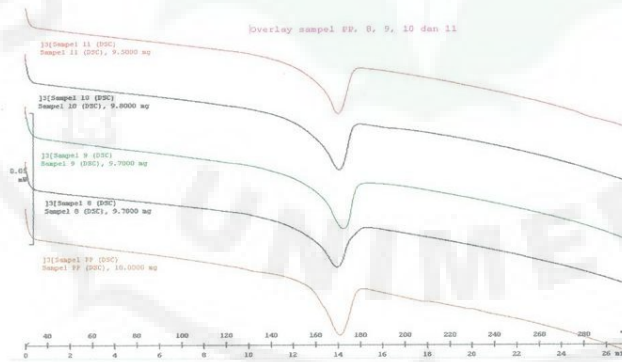


Figure 3. Thermogram DSC blend PP/PPMA /natural nano zeolite calcination

2. The Result Analysis Thermal Composite Blends PP/ PPMA/nano natural zeolite without Calcination

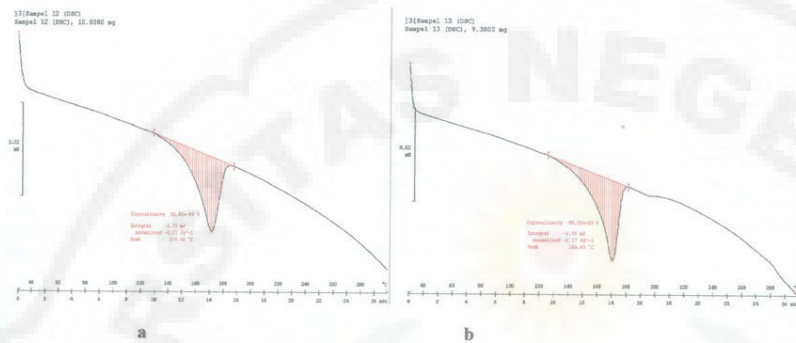


Figure 4. Thermogram DSC blend PP/PPMA natural nano zeolite without calcination a, 2 % , b 4%

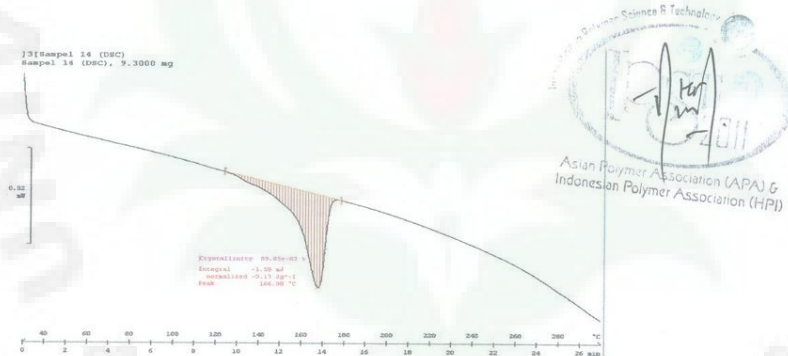


Figure 5. Thermogram DSC blend PP/PPMA / natural nano zeolite without calcination 6 %

Table 5. Melting Temperature Blends PP/PPMA/ nano natural zeolite without Calcination

Composition nano natural zeolite Calcination (%)	Temperature melt Tm (°C)	Crystallinity (X _{komp}) (%)	ΔH (J/g)
0	168,66	92,95 e ⁻⁰³	-0,18
2	170,80	92,02 e ⁻⁰³	-0,17
4	169,63	90,25 e ⁻⁰³	-0,17
6	166,90	89,05e ⁻⁰³	-0,17

From Table 5 looks composition of natural zeolite nano without calcination of 2% has a melting point temperature greater than yan with nano filler particles of natural zeolite on the composition of 6%. this is caused by increased dispersion of the bond between the face diatara fillers nature zeolite polypropylene and PPMA of the study ⁷, the addition of PPMA compatibelizer cristalytics can increase the degree of polypropylene composites containing hemp fiber, this is caused by chain branching between maleated anhydride and better dispersion between PPMA in polymeric materials. Thermal stability is generally a function of bond energy, when temperature rises to the point where the vibration energy causing bond breaking, then the corresponding polymers decompose.

The results of DSC analysis to determine the enthalpy by measuring the differential heat flow required to maintain an inert reference materials and samples at the same temperature. The temperature is usually programmed to scan a wide range of temperatures by increasing linearly at a rate that has prediction the an important information which can be obtained on a semi-crystalline polymer is the material crystallinity content. Many of the mechanical properties, physical and chemical properties of polymers depend importantly on the composition of mixtures and are influenced by crystallization conditions such as temperature, pressure, weight, orientation, molecular, . Melting temperature is an important for thermoplastics because they represent the minimum temperatures required for polymer processing .

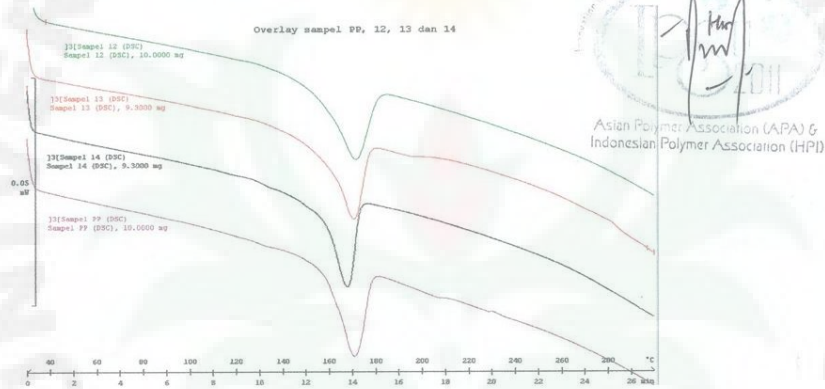


Figure 6. Thermogram DSC blend PP/PPMA natural nano zeolite calcination (PP,2,4,6) wt %

Melting temperature behavior is highly dependent on the chemical structure of the material along with the size and regularity of crystallites found in the phase cristalin . The temperature of crystallization. Can be obtained from the DSC cooling scan of the melting temperature above ambient conditions. Crystallization temperature of the polymer which can often provide information more informative characterization. This is due to the high inherent sensitivity of this test to detect subtle differences in the makeup of a given polymer ²⁰. The purpose of this section is to determine the effect of natural zeolite nano, PPMA and elastomeric compatibilizers on the crystallization temperature), melting point and crystallinity content of the PP in the mixture. Crystallization temperature), melting point of the % crystallinity and heat of fusion (ΔH) values for all the mixtures of PP and PP are given in Table 5. Figure 6 shows the first DSC heating curves of PP / PPMA, PP / PPMA / NZC 2%, PP / PPMA / NZC 4% and PP / PPMA / NZC 4%. In the thermogram showed that all materials are shown a single melting endotherm on melting temperature is relatively constant at about 166 °C. As can be seen from Table 5, remain unchanged with the addition of natural zeolite with nano PPMA compatibilizer. However, nanocomposites slightly higher than pure PP after tertentunano combined with the amount of natural zeolite. This suggests that the crystals in the PP nanocomposites thicker and more perfect than pure PP. These results are consistent with studies ^{11,12,13}. Conversely, the incorporation of the copolymer. Endothermic melting region is calculated and reported as heat fusion, ΔH . AH is an important parameter because the magnitude is proportional to the overall level of is owned by the polymer. So, from H Δ , can be estimated ¹¹. In mixed PPNC, incorporation of natural zeolite onano 2% to 6% to the PP has led value of tensile strength of PP increased. This means that the presence of small amounts of natural zeolite nano

in PP increased PP nucleation. These results are similar to the results of research that studies^{12,13,14} crystallization behavior and morphology of pure PP and the three different PP / clay nanocomposite in detail. They found that the clay particles act as nucleating agent for crystallization of PP matrix and improve the content of crystallinity of PP matrix. reported that the mineral filler is very likely affect the crystallization process of semicrystalline polymers quantitatively and qualitatively¹⁹. Similar increases in crystallinity has been reported not only for the PP / organoclay nanocomposites, but also for other polymer / organoclay nanocomposites like nanocomposite polietilen¹⁵

On the other hand, the incorporation of natural zeolite nano with natural rubber and PP also showed a similar effect, which increases with increasing filler nano natural zeolites, X(kom) PP reported that the measured crystallinity of PP, PP nanocomposite with 4 wt% and 7.5 %-wt was 43.7%, 47.2% and 48.7%, respectively. A similar observation was reported by¹⁶ who studied the effect of organoclay PP / organoclay / elastomer ternary mixture. It is found that the crystallinity of PP in the blend of PP increased with the addition of 3wt% organoclay particles.¹⁶ that the nucleation ability of organoclay increases with organoclay content increases, thereby increasing the relative degree of crystallization.

3. Analysis of XRD Diffraction pattern with a mixture of PP / PPMA / nano natural zeolite calcination

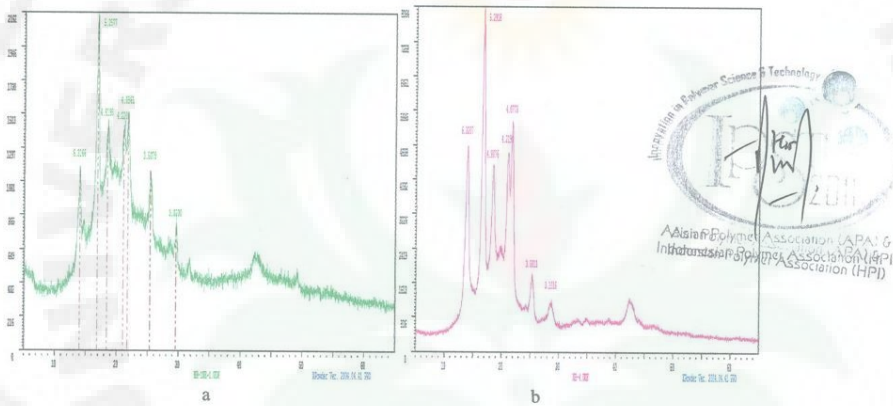


Figure 7. X-Ray Diffraction a. Polypropylene b. blend PP/PPMA

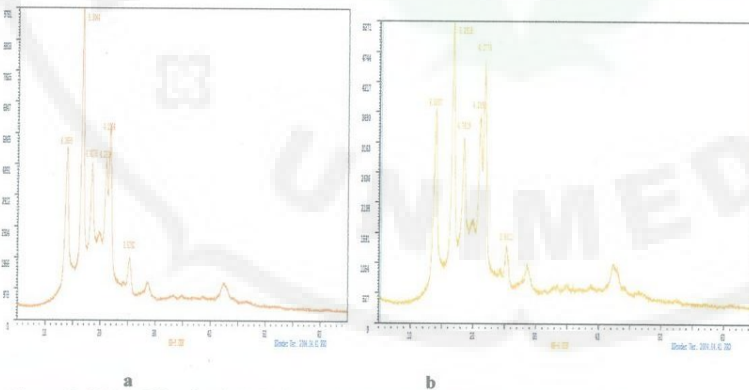


Figure 8 . X-Ray Diffraction (XRD) blend PP/PPMA/ Nano natural zeolite calcination a, 2 %-wt , b 4 %-wt

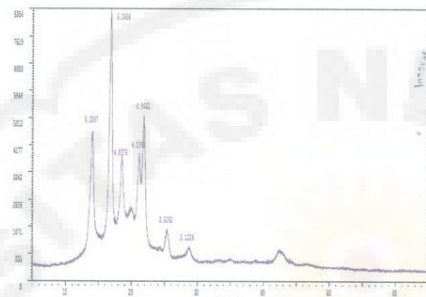


Figure 9 . X-Ray Diffraction (XRD) blend PP/PPMA/nano natural Nano zeolite calcination 6 %-wt

Table 6 . XRD -Diffraction Blends PP/PPMA/ Composition nano natural zeolite Calcination .

Compositon natural nano natural zeolite Calcination (%)	Angle (2θ)	d (Å)
PP	16.820	5,2677
0	16.815	5,2918
2	16.705	5,3044
4	16.855	5,2918
6	16,835	5,2606

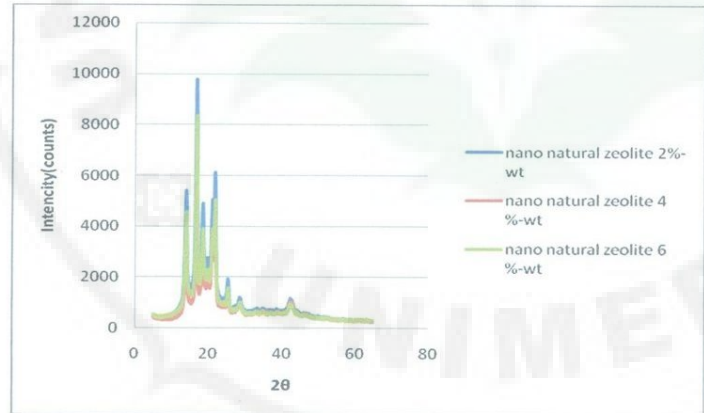


Figure 10. Combined Diffraction pattern for the mixture of PP / PPMA / Nano natural zeolite calcination

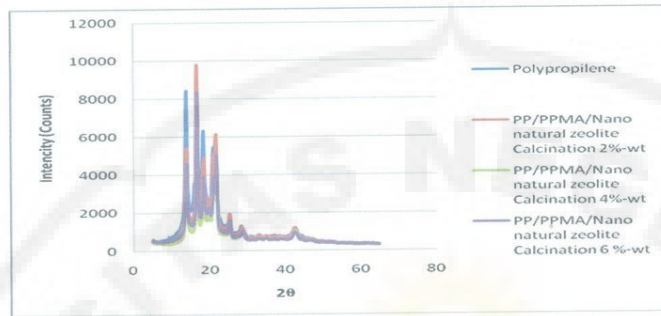


Figure 11 . Combined Diffraction pattern for the mixture of PP / PPMA / Nano natural zeolite calcination

Figure 10 shows the XRD charts for the polypropylene / PPMA / nano natural zeolite calcination, and from Table 6 shows that there is an increase in d- spacing of the composition of natural zeolite nano calcination of 0%, 2%, 4% and 6% at an angle 2θ. the addition of natural zeolite into a polymer matrix nanocomposite was carried out on the weight percent of different natural zeolite nanocomposite is 0.2, 4 and 6 percent by weight. From the figure shows that an increase in d- spacing of 5.2677 polypropylene d- spacing (Å), polypropylene / PPMA without natural zeolite 5.2918 (Å), natural zeolite nano composite namely 5.3044 (Å) in polypropylene / PPMA / natural zeolite nanocomposite 2% weight of 5.2918 (Å) in polypropylene / PPMA / nano natural zeolite nano composite 4% by weight, 5.2606 (Å) and the polypropylene / PPMA / natural rubber-natural zeolite nanocomposite 6%. This increase indicates that the polymer with nano intercalasi between natural zeolite calcination, where the largest increase occurred in the addition of 2% and 4% by weight. Data from the d-spacing (Å) and 2 θ (degree) of natural zeolite nano calcination. This suit also study¹⁸, which uses organoclay nanoscale composites with natural rubber. According to research¹⁷, mentions that the nanometer-sized reinforcement material such as silica, calcium carbonates, and clay is a material that can function as a compatibilizer between the polymer blend that does not dissolve each other (immiscible). It is well known that PA6 are polar while the PP non-polar, so that mixing PA6/PP an immiscible polymer blending

Analysis of XRD diffraction pattern with a mixture of PP / PPMA / nano natural zeolite without calcination

To analyze the XRD diffraction pattern for a mixture of Polypropylene, PPMA and nano-composites prepared without calcination results dal pata table form as shown in table 6 , as well as images 12 up 14. respectively for the composition of natural zeolite nano without kaisnasi as much as (2,4,6) wt%



Figure 12 . X-Ray Diffraction (XRD) blend PP/PPMA/natural Nano zeolit alam without caltination 2 %-wt

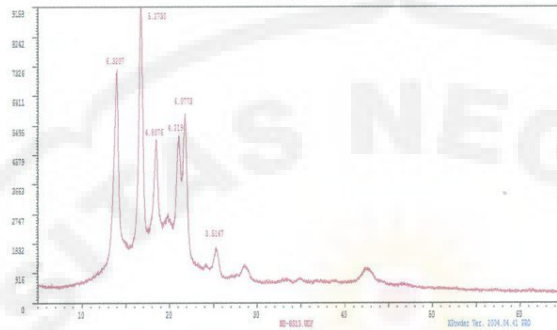


Figure 13 . X-Ray Diffraction (XRD) blend PP/PPMA/natural Nano natural zeolite without calcination 4 %-wt

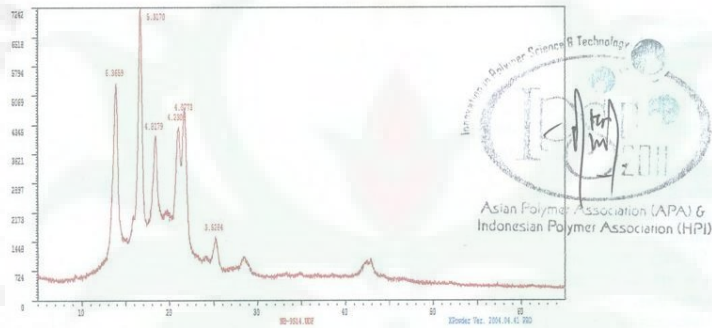


Figure 14 . X-Ray Diffraction (XRD) blend PP/PPMA/ Nano natural zeolite without calcination 6 %-wt

Table 7. XRD with a mixture of PP / PPMA / differences in the composition of natural zeolite nano without calcination.

Composition natural nano zeolite uncalcination (%)	Angle (2θ)	d (Å)
2	16.890	5,2730
4	16.805	5,2730
6	16.720	5,3170

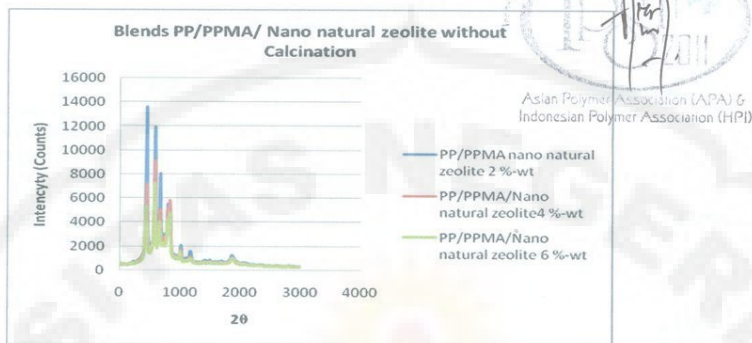


Figure 15 . X-Ray Diffraction (XRD) blend PP/PPMA/natural Nano zeolite without calcination

Figure 15 shows the XRD charts for the polypropylene / PPMA / natural zeolite and nano without calcination, and from Table 7 shows that there is an increase in d spacing of the composition of the nano without calcination of the natural zeolite, 2%, 4% and 6% at an angle 2θ . The addition of natural zeolite into a polymer matrix nanocomposite was carried out on the weight percent of different natural zeolite nanocomposite that is, 2, 4 and 6 percent by weight. From the figure shows that there was an increase of d- spacing, natural zeolite nanocomposite namely 5.2730 (Å) in polypropylene / PPMA / natural zeolite nanocomposite 2% by weight, 5.2730 (Å) in polypropylene / PPMA / natural zeolite nanocomposite 4% by weight, 5.3170 (Å) and the polypropylene / PPMA / natural rubber-natural zeolite nanocomposite 6%. This increase indicates that the polymer with nano intercalasi between natural zeolite calcination, where the largest increase occurred in the addition of 6% by weight. Of d-spacing (Å) and 2θ (degree) of natural zeolite nano calcination on the composition of the largest intensity of 2% natural zeolite nano without calcination. this corresponds also to the research, 18 which uses organoclay nanoscale composites with natural rubber. According to research 17, mentions that the nanometer-sized reinforcement material such as silica, calcium carbonates, and clay is a material that can function as a compatibilizer between the polymer blend that does not dissolve each other (immiscible). It is well known that PA6 are polar while the PP non-polar, so that mixing PA6/PP an immiscible polymer blending .This result means that the interlayer distance increases from 5.2730 Å menjadi 5, 3170 Å, which clearly indicates that the macromolecular chains Polypropylene has been punctuated the natural zeolite nano gallery. with an increase in d spacing is clearly indicating that the macromolecular chains of polypropylene have been interspersed into the organo-zeolite. From Figure 15, a mixture of PP / PPMA / natural zeolite nano without calcination also has the structure of a mixture of intercalation and exfoliation.

CONCLUSIONS

From the results of research and discussion on a mixture of PP / PPMA / natural zeolite nano without calcination and calcination with the variation of composition and 2,4,6 wt% the composition of the second variation, 4, 6% by weight with some characterization, among others, for the manufacture of nano-zeolite composite nature of the North Tapanuli area of North Sumatra Province with and without calcination process with a ball mill for 10 hours of the conclusion

1. The results of thermal analysis for a mixture of PP / PPMA / nano natural zeolite, From the analytical results obtained by DSC melting point of mixture of PP / PPMA / greatest on the composition of nano zeolite calcination 2%, 171.5^o C and without calcination 2%, 170.8^o C

2. Analsia XRD results in a mixture of PP / PPMA/nano natural zeolite calcination, the largest distance d obtained 5.3044 Å spacing on the composition of 2% for natural zeolite obtained without calcination on the composition of 5.3170 Å 6%

3. There are the influence of maleated anhidrid polypropylene (PPMA) compatibility the mixture of PP / natural zeolite nano without calcination calcination and it looks homogeneous mixture and spread evenly zeolite nano

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