

# Q&A Group 06.07.2020

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In this section, all your questions have been categorized to be answered more efficiently.

# Categories

- Glass Transition Temperature, T<sub>g</sub>
- Molecular Weight Distribution
- DPM
- Crosslinking
- Additives
- Others

# Glass Transition Temperature, $T_g$

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- How is it possible to have  $T_{g1}$  and  $T_{g2}$  for a material? -*Constanza Alvarez Lopez-*

➤ *Yes, if the material is a block copolymer or a blend*

- Are there any methods (besides adding plasticizers) that can reduce the glass transition temperature ( $T_g$ ) of any polymer? -*Seyedehniousha Mousavi-*

➤ *Basically, that is the best way to modify it*

- What is the correlation between glass transition ( $T_g$ ) and melting temperature ( $T_m$ ) for semicrystalline polymers? -*Seyedehniousha Mousavi-*

➤ *There is an empirical correlation:  $T_g/T_m$  ratio of between 0.56 and 0.76.*

- Can we say that as  $T_g$  increases,  $T_m$  also increases? What is DPM in things that affect processability of polymers (i.e. elasticity and viscosity)? -*Seyedehniousha Mousavi-*

➤ *Please, see the answer above. We will talk about DPM in class*

# Glass Transition Temperature, T<sub>g</sub>

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- When do you work below glass transition temperature and when do you work above glass transition temperature? *Katya Michelle Aguilar Pérez*
  - *All depends on the use. Let me explain that in class.*
- -How is T<sub>g</sub> affected if you have silicate nanoplatelets in the polymeric matrix? (Case of a composite material)-*Angel Manuel Villalba Rodríguez*
  - *If the concentration of the particles is such that affects the length of the segmental unit it might affect it.*
- Could you please explain the determination of t<sub>g</sub> using a dilatometer? *Zahra Taravatfard-*  
*Please watch the video Dilatometry:* <https://www.youtube.com/watch?v=42SaPEsx8Gg>
- Could you please explain page 4 of the paper. I found some conflicts.-*Zahra Taravatfard-*
  - *We will talk about on Friday*

# Glass Transition Temperature, T<sub>g</sub>

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- Why if we have more temperature you have more order, semi-crystalline polymer, if you have more energy? *José Iván Avilés Castrillo. NO ENTIENDO LA PREGUNTA*
- Are there other polymers where T<sub>g</sub> changes with branching size, instead of polyethylene? *Juan Jesús Rocha Cuervo Yes, there are many cases not just PE*
- 1- By having copolymer, the T<sub>g</sub> of final material will be changed. I wanted to know is there any specific rules for each type of copolymers like alternative or graft to how affect the final T<sub>g</sub> or it depends on the monomers only? I mean Alternative Copolymer is more effective on T<sub>g</sub> or Graft Copolymer for example? - *Elnaz Hosseinzadeh- Yes, there are mixing rules. See paper: Glass Transition Behaviors of Random and Block Copolymers and Polymer Blends of Styrene and Cyclododecyl Acrylate. I. Glass Transition Temperatures: <https://www.nature.com/articles/pj197560.pdf?platform=oscar&draft=collection>*
- What happen if I combined a polymer with T<sub>g</sub> of -83°C with one of 560°C, will it Meting temperature increase or decrease?- *Diego Sebastián Ceciliano Franco- Need to discuss more you question. Please review the answeres given above*

# Molecular Weight Distribution

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- Is molecular weight logarithmic distribution in all polymers is gaussian or specifically for Polypropylene resin is like gaussian when it is represented in logarithmic? -*Javid Azimi Boulali*- *For all of them is better to have them in a semi-logarithmic plot.*
- Can you explain more about Mn and Mw? **We will see it in class**
- I do not understand how the molecular weight distribution of a resin is measured- *Jesús Alberto Martínez Espinosa*- **We will see it in class**
- How bad is it that polymer chains break? What properties in the polymer could change?- *Benjamín Alberto Moreno Núñez*- *The mechanical properties will be affected as well as the processability. Now I ask: Why?*
- I would like to understand better how to read an histogram of molecular weight distribution and how we can get assumptions to modify the rheological and mechanical properties of polymers. *Juan Jesús Rocha Cuervo* **We will see it in class**

# DPM

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- What is DPM? *Katya Michelle Aguilar Pérez (Oops; I left it in Spanish: Distribución de pesos moleculares)*
- In slide JBR-81, what does DPM stand for? *Antonio Osamu Katagiri Tanaka Distribución de pesos moleculares*

# Crosslinking

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- Are crosslinking and vulcanization different names for the same process? *Antonio Osamu Katagiri Tanaka*  
*The phenomena is the same, the chemical mechanism could will be different*
- Can we talk about the crosslinking of polymers in solution? (YES ) What other things are to be considered apart from the ones seen in class? (GELMA) Is it possible to crystalline (you mean crystallize) polymers with the evaporation of the solvent? (YES) *Antonio Osamu Katagiri Tanaka*
- What is the difference of rubber properties when we expose the poly-isoprene to vulcanization and to co-polymerization. Materials in a extreme cold state is brittle. Know which material to use under certain temperature conditions in which can be glassy.-*Julio Alberto Cao Romero Gallegos* *Please bring it up in the class so we can discuss it.*
- Are cross-linking, block copolymers and ionomers different forms to get synthetic rubber? *Juan Jesús Rocha Cuervo*



# Additives

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- 2- In the part of Polymer stability and degradation, regarding the additives: we add these additives to prevent any degradations during processing (because of oxygen and heat in extrusion) or we want to avoid any further degradation during the product life time and depend on its application?- *Elnaz Hosseinzadeh* **Both**
- if we add nanoparticles, like additives, its reduces the COF so how can affect to this process? *José Iván Avilés Castrillo*. (?????)
- - The thesis of a peer on the research group addressed the topic of recycled polymers in ultrasonic injection molding, and surprisingly, recycled polymers had higher stress values than virgin polymer. I'm haven't read his thesis, but, do you think it is because of the process or he may have added some stabilizer when he recycled the polymer?-*Marco Salazar Meza*- *(it could be that the higher stresses are due to a crosslinking , depends on the tyope polymer, let us check the comment)*
- - Is there a rule of thumb to know if a polymer is going to accept an additive and when is the right moment to add it? Like, what if i want to add Carbon NT to the polymer, should it be added during polymerization or is it best to add it during the processing, or in the pelletization? So, is there a rule or you need research? I'm guessing you need research, but maybe there's something -*Marco Salazar Meza*- **Let us discuss it in class**

# Others

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- About the optical properties we have discussed only reflection when crystal regions are formed. Can we expect any other optical properties to change depending on the structure of the polymer ? (retardance for example)-  
*Luis Alejandro Garza Soto- It can create opacity*
- I am curious about the PE and PC properties difference.-*Neda Karami- (?????) Flat like vs flexible chains*
- It was not quite clear for me what happen with the density when the temperature decrease and increase. What is the difference between linear-linear and linear-logarithm?-*Marino Luna Espinoza- we will see it in class*
- - Gonna ask this one again becauss i didn't find the Q&A for the 7/2/20 session: Why is heat deflection temperature used in polymers datasheets instead of the Tg? Because although similar, they're not the same (i've googled it). I believe it is because they're focused in the final product: you care more about when the polymer is going to lose stiffness, and therefore, when it is going to lose its function, rather than when it is going to melt? But that's what i think, maybe you can provide me full knowledge of this -*Marco Salazar Meza- It s important to measure the properties but is better to do that on those related to the final operfiormance of the product*

# Others

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- What is the cost (scientific, economic, social, etc) to start using natural polymers instead of synthetic polymers? - *Diego Sebastián Ceciliano Franco*- **Let us discuss it in class**
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- I want to know more about some polymers of a video like: Isoprene. Polyisoprene. Ionomers. And polymers based on carbon: Polysiloxanes Polydimethylsilane. Polydimethylgermane. Polydimethylstannane. - *Jonathan Rafael Núñez Gálvez*- **(?????)**
- Also, what are the differences between based carbon polymers and others? - *Jonathan Rafael Núñez Gálvez*-  
*Energy of formation is one of them*
- In DSC method, how exothermic peak is measured? (Because we have only heater in the DSC machine) Endothermic is understandable because the heater generates heat to the chamber and we can measure that amount of heat but what if the sample generates heat to the chamber? How it is measured?! -*Javid Azimi Boulali*-
- **Let us discuss it in class**
- What is 'reduced reversion' and why is it considered as the most important benefit of NR? -*Seyedehniousha Mousavi*- **(?????)**