Table 1 The result of DMA measurements of composites (Storage modulus G in Pa)

Investigation of mechanical properties of sea-shell-$CaCO_3$/LDPE composites

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OBJECTIVES

Calcium carbonate ($CaCO_3$):

- Reduced cost
- Abundance
- Fire resistant
- shell wastes reduction
- potentialities as industrial applications

Commonly used as a filler to toughen polymers

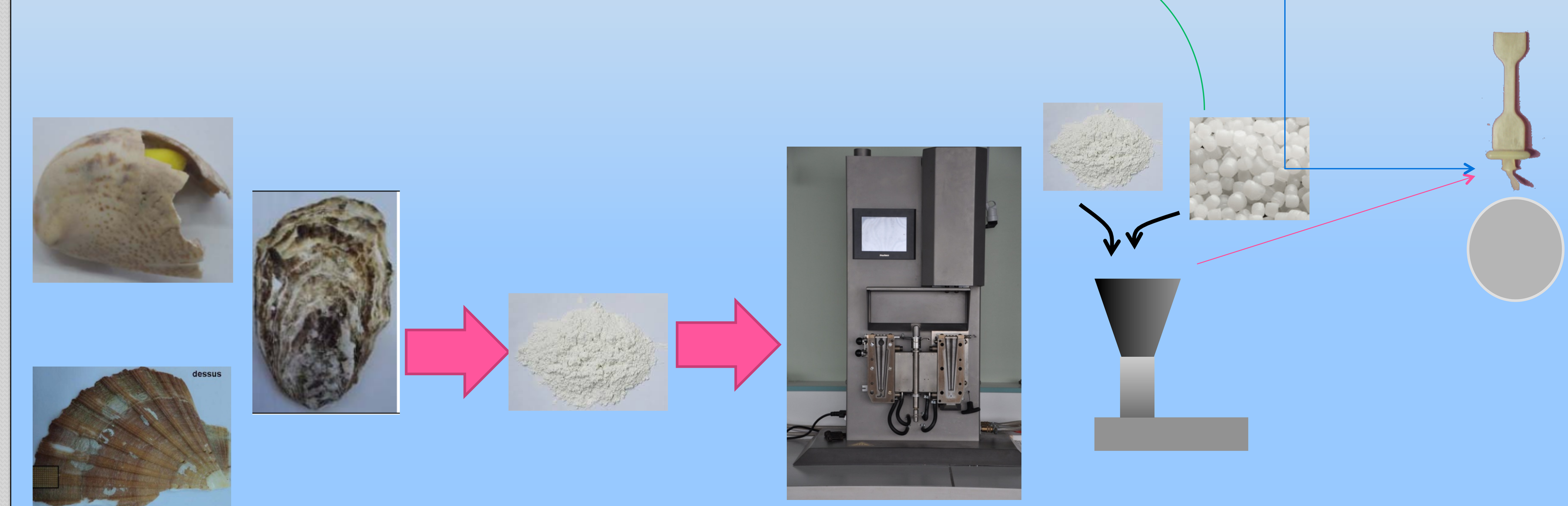
- Use calcium carbonate particles obtained spare sea shells (crepidula, oyster and scallops) as fillers in polyethylene matrix
- Investigation of structural, morphological and mechanical properties

MATERIAL AND METHOD

Materials → PE and biogenic CaCO3

Methods →

- Elaboration; double screw injection molding
- XRD, SEM, FTIR, TGA
- DMA, DSC, Tensile Test



CONCLUSION

Calcium carbonate is a abundant resource present in biogenic shell, possibly used as filler in polymer matrix. The PE/ CaCO3 composite reveal to be attractive as a cheap bio material that can use spare shells, at low price since no shell decomposition is needed (only grinding). Because higher thermal stability polymers are necessary, it is valuable for industrial production and practical application.

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RESULTS AND DISCUSSION

Morphology

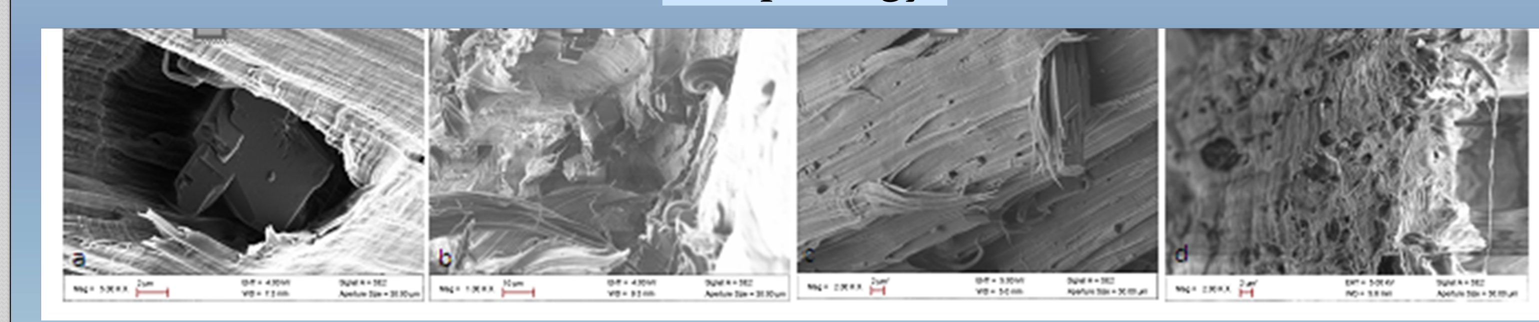

Figure 1 Microstructure of fractured samples a)Pure PE b) PE-10% aragonitic crepidula c)PE-%10 aragonitic scallop, d) PE-%10 calcitic oyster

Composition

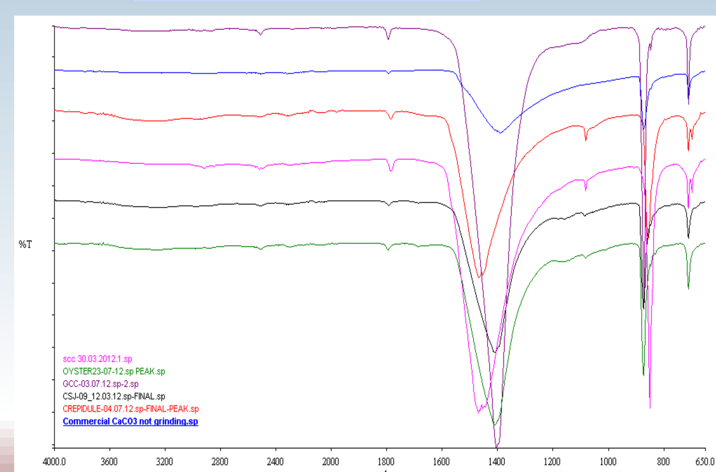

Figure 2 FTIR observations of samples

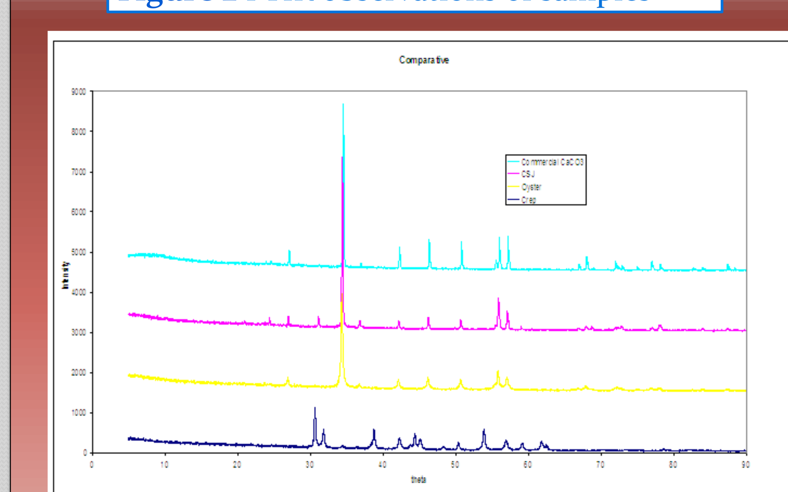

Figure 3 XRD pattern of samples

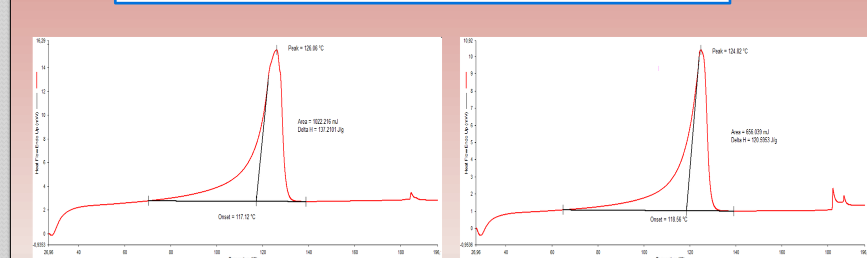

Figure 4 DSC results of samples a)5%PE-CSJ b) 10% PE-CSJ

Mechanical

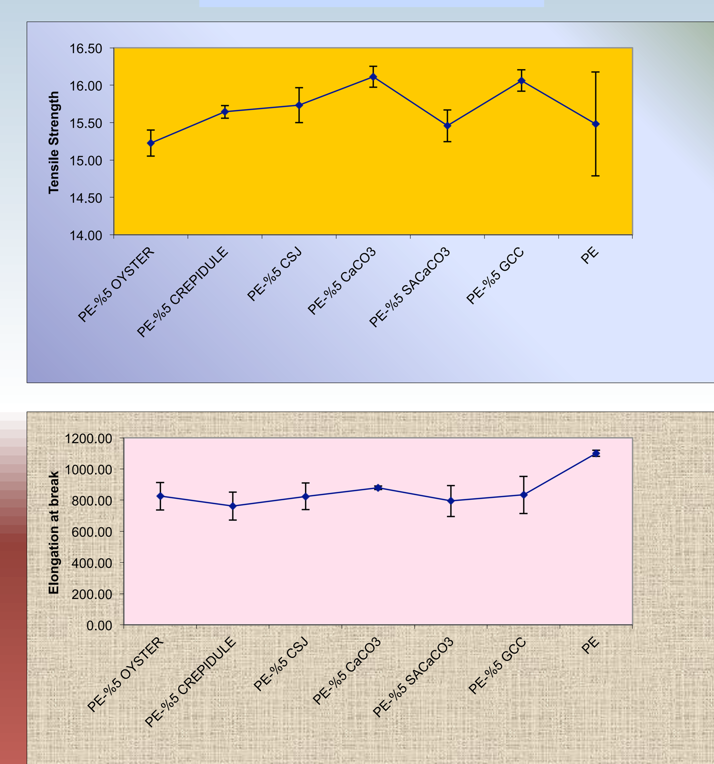

Figure 5: Tensile strength and Elongation at break of some samples

Table 1: The result of DMA measurements of composites (Storage modulus G in Pa)

SAMPLE	5% (Pa)	10% (Pa)	15% (Pa)
PE	2,81		
PE+ CaCO3	3,09	3,20	4,08
PE+ CREPIDULE	2,72	2,81	2,94
PE+ OYSTER	2,78	2,83	3,00
PE+ SCALLOP	3,10	3,04	3,13
PE+ ARAGONITE	3,19	3,45	
PE+ GCC	2,62	2,78	2,86
PE+ SA COATED CaCO3	2,79	3,09	
PE+SA COATED CREPIDULE	2,73	3,15	3,34
PE+SA COATED OYSTER	2,86	3,01	3,25
PE+SA COATED SCALLOP	2,95	3,17	3,23
PE+ SA COATED ARAGONITE	2,59	2,64	
PE+ SA COATED GCC	2,56	2,94	3,21

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