Composite materials for advanced applications

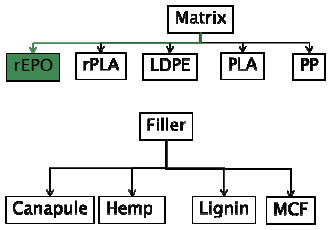
Giuseppe Saccullo

Dottorato in Ingegneria dei sistemi, Energetica, Informatica e delle Telecominicazioni, XXXI Ciclo

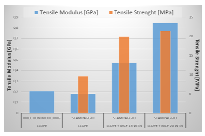
Scope

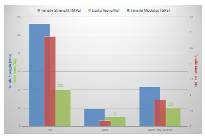
The present reserarch is focued on the understanding of structure-property-processing correlation of FDM materials. Furthermore, the knowldge gained will be used for the development of optimised polymer composites formulations for FDM

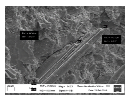
Processing equipment and materials tested

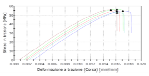


Microcomposite development

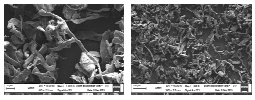


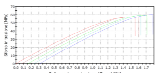






Material	Tensile Strength (Mpa)	Tensile Modulus (GPa)
LV100	29.70	6.3
PLA/Canapule	33.5	4.9



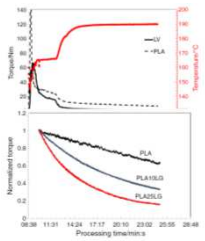


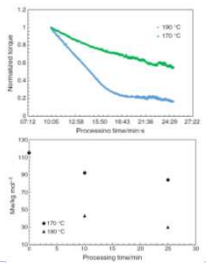
Material	Tensile Strength [MPa]	Tensile Modulus [GPa]
Hy	23.6	3.5
Hy1 Cellulose	58.8	5.19
Hy2 Cellulose	53.89	7.1

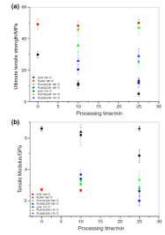
Company	Material	TS (Mpa)	E (GPa)	Price (€/kg)
ColorFabb	PLA/PHA	61,50	7,06	47,9
	PLA wood	46,00	8,29	66,59
3dxtech	PLA	56,00	2,86	32
	PLA + CF	50,00	7,71	75,95
3dxtech	ABS	41,00	1,75	32
	ABS + CNT	36,00	2,46	75,95
OO-KUMA	ABS + CNT	42,00	2,33	79,48
	ABS	41,00		
	ABS + CF	52,00		

		TS (Mpa)	E (GPa)
Green Value	PLA	49,16	3,44
	PLA/10IG	45,86	3,70
Arboform	PLA/20IG	25,90	3,84
	IV	29,75	5,50
PP/LV/Hemp	LV @170°C	11,54	5,10
	K0	37,20	1,94
	K10	37,00	2,40
	K20	35,80	2,53
Canapule	PLA/Canep	53,50	4,00
Cellulose	Hy	23,60	3,50
	Hy1	58,80	5,19
	Hy2	53,89	7,10

Controlling Processing Induced Degradation

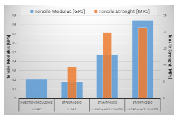


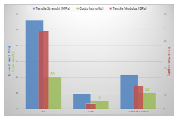


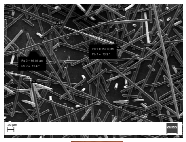


G.Cicala e al J Therm Anal Calorim DOI 10.1007/s10973-017-6253-0

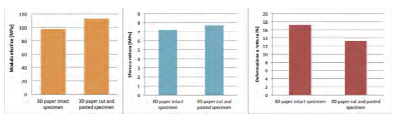
Enhancing mechanical properties at reduced price/kg by compounding: using MCF as reinforcement

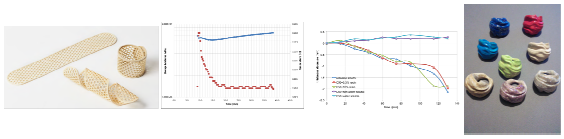




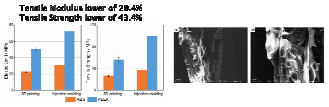


Functional Application Development

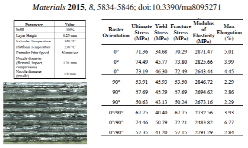




Tensile Modulus lower of 28.4%
Tensile Strength lower of 43.4%

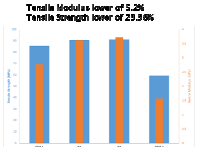


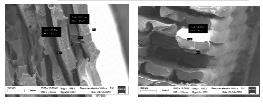
Materials **2015**, *8*, 5834-5846; doi:10.3390/ma8095271

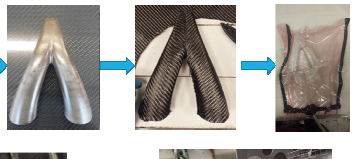


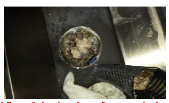
K. M. Rahman et al Proceedings of the IMECE2015

Tensile Modulus lower of 5.2%
Tensile Strength lower of 29.56%









After 1 hr in the ultrasonic bath

After 4 hrs in the ultrasonic bath