

# Effect of Silane Treated and UN –Treated Jute and Glass hybrid Polymer Composites

H. Bharath Kumar, J. Jensin Joshua, Ravi Teja Devineni, A. Abraham Eben Andrews, G. Mahesh



**Abstract:** In today's world, composite is the most emerging field of material science. Different manufacturing techniques can be used for making hybrid composites and the properties like micro structure, electric properties and weather resistant properties of composites need to be studied according to end use of composite. Different fiber modification techniques (Physical or Chemical) can be used to improve its mechanical as well as chemical properties. The aim of this research work is effect of Alkali treated along with Silane treated and untreated fibres hybrid composite was prepared and all the types of physical and chemical properties studied. All the Silane treated composite shown enhanced concert than untreated composite. Performance possessions of composite devising various tenders in textile & non textile. Silane has an added advantage both physical and chemical properties enhancement.

**Keywords:** Silane Treatment; Jute; Glass; Hybrid Composites; Structural Bio compounds.

## I. INTRODUCTION

Fiber bond compound items can be utilized in outside and inside of a building, for example, siding, material, outer cladding, interior coating, floors, dividers, building boards, blocks, propping, fencing and improving components [1-3]. Fiber bond is likewise utilized in construction works, for example, dam, connect deck, street building, walkway, flagstone clearing, and so on [4-7]. Strands have two capacities in the post-breaking zone. To start with, they increment the methods for moving anxieties and loads over the breaks. Besides, strands increment the sturdiness of bond compounds by making vitality absorbing instruments with respect to the breaks and the debonding. Sisal filaments can be the replacement asbestos-concrete compounds, which are risky for human and creature health [8-10].

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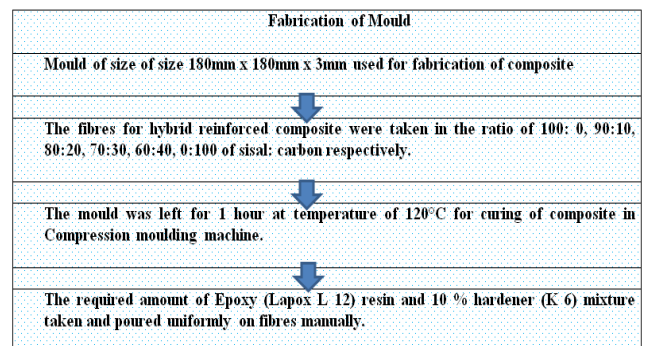
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Sisal filaments increment the sturdiness of concrete compound. One may utilize the quality of hemp filaments and infusion embellishment to make ledges that are extraordinarily light yet sturdy. Maturation strategies, similar to those used to make wine and brew, are utilized in the process with explicitly planned microorganisms [11-13]. As a rule, ledge is fascinating because of its biodegradability attributes. There is an expanding development of researchers and architects who are committed to limiting the ecological effect of polymer compound creation [14-17]. Natural impressions must be lessened at each phase of the existence cycle of the polymer compound [18-20]. Utilizing common filaments with polymers dependent on sustainable assets will enable numerous natural issues to be unraveled [21].

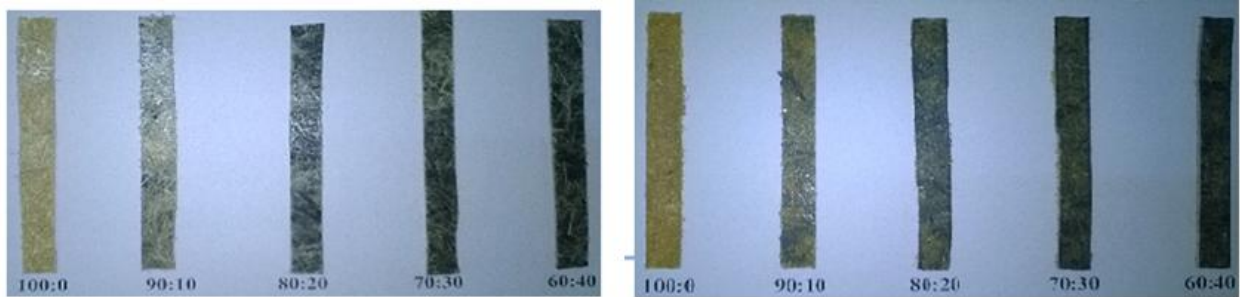
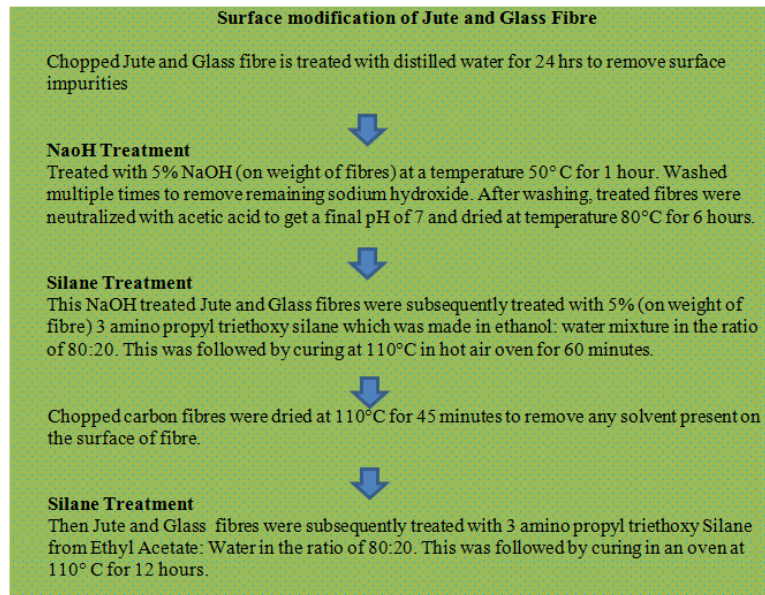
## II. SPECIMEN AND EXPERIMENTAL

Material and Chemicals	Function	Grade
Glass fibre	Reinforcement material	-
Jute Fibre	Reinforcement material	-
Silane XIAMETER OFS 601I	Coupling Agent	-
Epoxy Lapox L 12	Resin	-
Hardener K6	Hardener	-
Ethanol	Silane Application	AR
Ethyl Acetate	Silane Application	AR
Sodium carbonate	Chemical Testing	AR
Acetic acid Pure	Chemical Testing	AR
Toluene	Chemical Testing	AR
Carbon tetrachloride	Chemical Testing	AR
Hydrochloric acid	Chemical Testing	AR
Nitric acid	Chemical Testing	LR
Benzene Extrapure	Chemical Testing	AR



Fabrication of Mould [22-25]

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### III. RESULT AND DISCUSSION

Table .1 Effect of Silane Treatment on Tensile Strength of Jute : Glass Hybrid Composites.

SR no	Composition Jute : Glass	Tensile strength (MPa) Silane Untreated composites	Tensile strength (MPa) Silane Treated composites
1	Matrix	26.32	27.42
2	100:0 (A)	30.61	36.7
3	90:10 (B)	36.54	41.65
4	80:20 (C)	44.32	50.4
5	70:30 (D)	56.83	60.55
6	60:40 (E)	70.81	73.1
7	0:100 (F)	125.45	127.83

Table .2 Effect of Silane Treatment on Tensile Modulus of Jute : Glass Hybrid Composites.

Sr. No.	Composition Jute : Glass	Tensile Modulus (GPa) Silane Untreated Composites	Tensile Modulus (GPa) Silane Treated Composites
1	Matrix	0.82	0.97
2	100:0 (A)	1.52	1.92
3	90:10 (B)	1.72	1.97
4	80:20 (C)	1.85	2.71
5	70:30 (D)	2.85	2.89
6	60:40 (E)	2.89	2.91
7	0:100 (F)	3.1	3.26

Table .3 Effect of Silane Treatment on Flexural Strength of Jute : Glass Hybrid Composites.

SR No.	Composition Jute : Glass	Flexural Strength (MPa) Silane Untreated Composites	Flexural Strength (MPa) Silane Treated Composites
1	Matrix	57.21	58.23
2	100:0 (A)	63.23	69.35
3	90:10 (B)	69.32	79.38
4	80:20 (C)	79.25	97.29
5	70:30 (D)	89.56	104.14
6	60:40 (E)	120.36	132.39
7	0:100 (F)	165.36	187.32

Table .4 Effect of Silane Treatment on Impact Strength of Jute : Glass Hybrid Composites.

SR no	Composition Jute : Glass	Impact (J/m <sup>2</sup> ) of Silane Untreated Composites	Impact (J/m <sup>2</sup> ) of Silane Treated Composites
1	Matrix	212	225
2	100:0 (A)	271	286
3	90:10 (B)	3301	342
4	80:20 (C)	310	356
5	70:30 (D)	325	456
6	60:40 (E)	353	479
7	0:100 (F)	391	510

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Table. 5 Effect of Silane Treatment on Chemical Resistance of Treated Jute : Glass Hybrid Composites.

Composition	Chemicals							
	Toluene	Benzene	CCl <sub>4</sub>	H <sub>2</sub> O	CH <sub>3</sub> COOH 8 %	HCL 10%	NaOH 10%	Na <sub>2</sub> CO <sub>3</sub> 20 %
Jute : Glass								
Matrix	0.0043	0.0054	0.0049	0.0008	0.0043	0.0028	0.0024	0.0029
100:0	0.0117	0.0288	0.0218	0.0352	0.0415	0.0480	0.0301	0.0410
90:10	0.0255	0.0147	0.0257	0.0322	0.0345	0.0556	0.0213	0.0319
80:20	0.0081	0.0116	0.0194	0.0148	0.0625	0.0287	0.0692	0.0365
70:30	0.0163	0.0091	0.0094	0.0160	0.0410	0.0298	0.0447	0.0420
60:40	0.0066	0.0086	0.0115	0.0098	0.0209	0.0223	0.0231	0.0223
0:100	0.0091	0.0027	0.0026	0.0016	0.0023	0.0036	0.0039	0.0048

Table. 6 Effect of Silane Treatment on Chemical Resistance of Treated Jute : Glass Hybrid Composites.

Composition	Chemicals							
	Toluene	Benzene	CCl <sub>4</sub>	H <sub>2</sub> O	CH <sub>3</sub> COOH 8 %	HCL 10%	NaOH 10%	Na <sub>2</sub> CO <sub>3</sub> 20 %
Jute : Glass								
Matrix	0.0041	0.0054	0.0049	0.0008	0.0043	0.0028	0.0024	0.0029
100:0	0.0092	0.0410	0.0157	0.0097	0.0316	0.0350	0.0276	0.0172
90:10	0.0159	0.0548	0.0208	0.0056	0.0193	0.0430	0.0196	0.0134
80:20	0.0063	0.0430	0.0019	0.0054	0.0213	0.0307	0.0224	0.0192
70:30	0.0097	0.0933	0.0115	0.0042	0.0186	0.0144	0.0147	0.0133
60:40	0.0068	0.0508	0.0174	0.0040	0.0128	0.0264	0.0119	0.0169
0:100	0.0079	0.0072	0.0054	0.0033	0.0061	0.0035	0.0049	0.0091

Table. 7 Effect of Silane Treatment on Hardness Treated and Untreated Jute : Glass Hybrid Composites.

SR No.	Composition Jute : Glass	Shore D Hardness of Silane Untreated composites	Shore D Hardness of Silane Treated composites
1	Matrix(A)	66	86
2	100:0 (B)	69	91
3	90:10 (C)	67	91
4	80:20 (D)	69	92
5	70:30 (E)	71	93
6	60:40 (F)	72	93
7	0:100 (G)	75	96

### III. CONCLUSION

From the Experimental Research of Silane Treatment on said Composites and the results shown in Table 3 to 7 the following conclusion has been drawn: Alkali treated along with Silane treated and untreated fibres hybrid composite was prepared and all the types of physical and chemical properties studied. All the Silane treated composite shown enhanced concert than untreated composite. Performance possessions of composite devising various tenders in textile & non textile. Silane has an added advantage both physical and chemical properties enhancement.

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I am **Ravi Teja Devineni**, currently pursuing my B.Tech final year in Dept. of Mechanical engineering in Hindustan institute of technology and science . I hail from Hyderabad. I came from a family of 4 members, my father is a businessman i.e. Contractor. Chose the field of mechanical engineering out of passion and interest. I am basically a good communicator as I can communicate in 5 languages which includes foreign language German, completed up to A2 level. So far, I have done 2 in-plant training's i.e. in BHEL, NSIC and participated in various department-oriented workshops in and outside the institute. I always have this keen interest in learning new things and exploring about them. So far completed 2 Design projects and whatever the work I have been assigned with I try to complete it with at most interest.



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