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Kabul Edilmiş Araştırma Makalesi (Düzenlenmemiş Sürüm)

Accepted Research Article (Uncorrected Version)

Makale Başlığı / Title	Doğal lif takviyeli mantar esaslı sandviç kompozitlerin viskoelastik özellikleri Viscoelastic properties of natural fiber reinforced cork based sandwich composites
Yazarlar / Authors	Yekta KARADUMAN
Referans No / Reference No	PAJES-56492
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[illegible] Corresponding Author [illegible] Research Article

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[illegible] kompozit malzemeler [illegible]

Anahtar kelimeler: [illegible] mekanik analiz

Abstract

Natural fiber reinforced composite materials have found many applications in various industries due to the fact that they are nature-friendly, low-cost and sustainable materials. In this study, jute fiber reinforced and cork based sandwich composites were produced and their viscoelastic properties were investigated. First, thin jute/polypropylene (PP) composite plates were produced by using jute/PP nonwoven fabrics and PP granules. Then these plates were placed on top and bottom faces of a cork plate and consolidated under pressure to produce sandwich composites. Dynamic mechanical analysis (DMA) was performed to determine the viscoelastic properties of the produced samples. It was found that sodium hydroxide (NaOH) treatment of fibers before composite preparation lead to higher mechanical properties of the composites. The produced sandwich composites can be used in construction industry as insulation material and office partition panels as well as in automotive industry.

Keywords: Jute fiber, Cork, Sandwich composite, Dynamic mechanical analysis.

[illegible]

[illegible] rezervlerindeki azalma, bu malzemeler yerine [illegible] polimerik kompozit malzemelere olan ilgi [illegible] geleneksel cam lifi takviyeli kompozitlerin yerine [illegible] [1-5] [illegible] zamanda [illegible] karbondioksit (CO_2) [illegible] kompozitleri ile rekabet edebilecek seviyededir [6, 7]. [illegible]

[illegible] durum lifle [illegible] pektin gibi amorf polimerler [illegible] kompozitlerin [illegible]

Düzeltilmemiş Sürüm - Uncorrected Version

[10] [illegible] sonucunda [illegible] [10] [illegible] [12]. [illegible] [13] [illegible] [14-18] [illegible] Rana vd. [illegible] [19] [illegible] [20]. [illegible] [21] Shanmugam ve Thiruchitrambalam [illegible] [22]. Karaduman vd. [illegible] [23] [illegible]

2 [illegible]

2.1 [illegible]

[illegible]

Tablo 1. [illegible]

Malzeme	Kopma mukavemeti (MPa)	Young modülü (GPa)	Kopma uzaması (%)
[illegible]	369	38.92	1.18
[illegible]	533	42.40	1.30
[illegible]	548	1130	30
[illegible]	2190	1.21	4.47

2.2 [illegible]

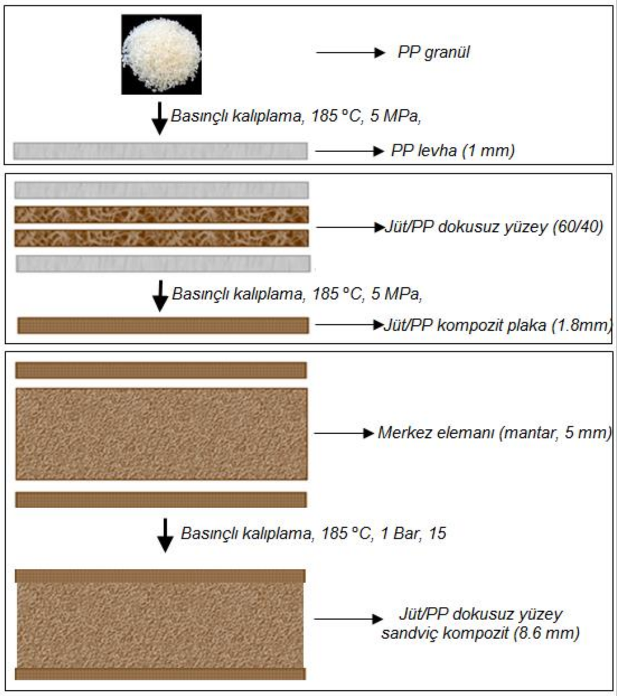
[illegible] 25 cm x 25 [illegible] kesilerek [illegible] plaka [illegible] kompozitlerde [illegible] [24] [illegible]

2.3 [illegible]

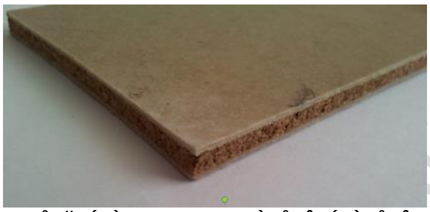
[illegible] [12, 13] [illegible]

2.4 Dinamik Mekanik Analiz (DMA) [illegible] DMA 8000 [illegible] ve test [illegible] bilgi vermektedir. Bu [illegible] kesitli numuneler [illegible]

#ȚÄË ąÓąÔÍÁ ÈąÚąÎÄÁ ÁÚÏÔ ÏÒÔÁÍąÎÄÁ 3ÁÌąÎąÍ ÆÒÅËÁÎÓą ÏÌÁÒÁË ρ (Ú ÓÅëÉÌÍÉħÔÉÒ8



¤ÅËÉÌ 3ÁÎÄÖÉë ËÏÍÐÏÚÉÔ ÐÌÁËÁÎ ÕÒÅÔÉÍ ÁÛÁÍÁÌÁÒą8



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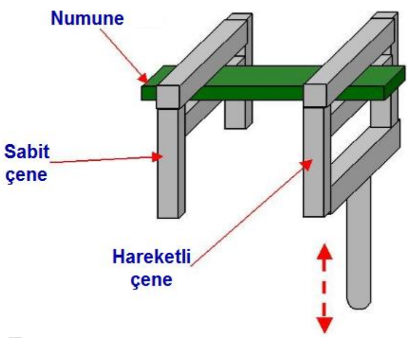

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2.5 4ÁÒÁÍÁÌą ÅÌÅËÔÒÏÎ ÍÉËÒÏÓËÏÂÕ 3%-

-ÒÅÔÉÌÅÎ ÎÕÍÕÎÅÌÅÒÉÎ ÍÏÒÆÏÌÏÊÉË ÏÚÅÌÌÉËÌÅÒÉ 3%- ÁÎÁÌÉÚÉ ÉÌÅ ÇĘÚÌÅÍÌÅÎÍÉħÔÉÒ8 ĘÒÎÅËÌÅÒ ÏÌÁÒÁË ÇÏÌÄ ÉÌÅ ËÁÐÌÁÎÍąħ ÖÅ ,ÅÏ τπ ÅÌÅËÔÒÏÎ ÍÉËÒÏÓËÏÂÕÎÄÁ ρπ Ë6 ÖÏÌÔÁÊ ÁÌÔąÎÄÁ ÉÎÃÅÌÅÎÍÉħÔÉÒ8

Tablo 2'ÄÅÒÅÔÉÌÅÎ ÎÕÍÕÎÅÌÅÒÉÎ dinamik ÍÅËÁÎÉË ĘÚÅÌÌÉËÌÅÒÉ malzemenin ÅÌÁÓÔÉË ÂĘÌÇÅÄÅ ÂÎÅÒÊÉ ÄÅÐÏÌÁÍÁ ÄÅøÅÒÉ (E′) ve malzemenin viskoz ËÁÒÁËÔÅÒÉÎÉ ÇĘÓÔÅÒÅÎ ÍÏÄÕÌÅÎ ÄÅÐÏÌÁÍÁ ÍÏÄÕÌÕ ÓĘÎÍÅÌÅÎÍÅ Maksimum depolama ve ËÁÙąÐ ÍÏÄÕÌÕ ÄÅøÅÒÌÅÒÉ ÉÎÃÅÌÅÎÄÉ ÍÒÅÔÉÍÉÎÄÁÎ ĘÎÃÅ ÕÙÇÕÌÁÎÁÎ ÁÌËÁÌÉ ËÁÙÄÁ ÄÅøÅÒ ÁÒÔąħÁ ÎÅÄÅÎ ÍÏÄÕÌÕÎÄÁ ÚÁËÌÁħąË ÞÿÙĦ ËÁÙąÐ ËÁÙÄÅÄÉÌÄÉ ÏÌÄÕ ÂÉÒ ÂÉÒÌÉËÔÅ ÂÕÌÕÎÁÎ ÐÁËÔÉÎĦ ÈÅÍÉÓÅÌÌÏÚ ÖÅ ÄÅÒÅÃÅÌÉ ÁÍÏÒÆ ÐÏÌÉÍÅÒÌÅÒ ÕÚÁË ÐÏÌÉÍÅÒÌÅÒÉÎÄÅ ÁÒÔąħ ÍÅÙÄÁÎÁ ÇÅ lifler poli ÍÅÒ ÍÁÔÒÉÓ ÉÌÅ ÄÁÈÁ ÉÙÉ ÂÉÒ getirmektedir [8]. "Õ ÄÁ ÌÉÆȚÍÁÔÒÉÓ ÁÒÁÙÕÚÕ ÅÔËÉÎ ÂÉÒ ÙÌÌ ÄÁøąÌąÍą ÖÅ ÙÌÌÁÓÁ vermektedir. $ÉøÅÒ ÂÉÒ ÆÁËÔĘÒ ÉÓÅ ÁÌËÁÌÉ ÌÉÆÌÅÒÉÎÄÅ ÍÅÙÄÁÎÁ ÇÅÌÅÎ ÍÕËÁÖÅÍÅÔ 1). Numunelerin ÇÅëÉħ ÓąÃÁËÌąøą ÅÒÉÎÇÅÍ ÁÌËÁÌÉ ÉħÌÅÍÉ ÎÕÍÕÎÅÄÅ ÇÅëÉħ ÂĘÌÇÅÌÅÒÅ ËÁÙÄąøą ÇĘÒÌÍÅËÔÅÄÉÒ ÉħÌÅÍÌÅ ÂÉÒÌÉËÔÅ ÌÉÆȚÍÁÔÒÉÓ ÁÒÁÙ ÍÏÌÅËÕÌÌÅÒ ÈÁÒÅËÅÔ ÁÌÁÎ ÍÉËÔÁÒ [23].

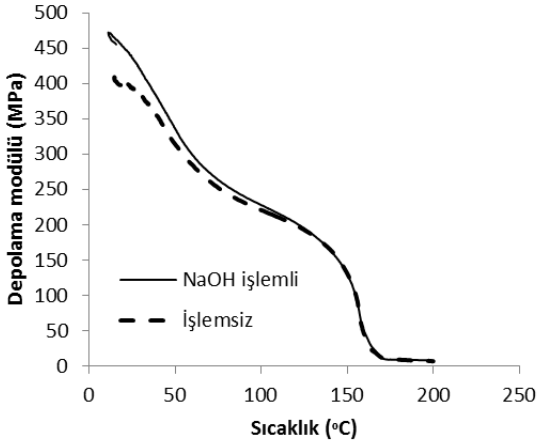
Şekil 4'ÄÅ ÄÅÐÏÌÁÍÁ ÍÏÄÕÌÕ ÄÅøÅÒÌÅÒÉ ÇĘÒÌÍÅËÔÅÄÉÒ8 ÁÒÔąħ ÉÌÅ ÂÉÒÌÉËÔÅ ÄĦÌĦÌ ÍÅÙÄÁÎÁ ÇÅÌÅÎ ÄÅøÅÒÉ ÓąÆąÒÁ ÄĦÏÍÅÔÅÄÉÒ8 "Õ ÓąÃÁËÌąËÌÁ ÂÉÒÌÉËÔÅ ÙÕÍÕħÁÍÁÓąÁ [25]

4ÁÂÌÏ ςą 3ÁÎÄÖÉë ËÏÍÐÏÚÉÔ ÍÁÌÚ ĘÚÅÌÌÉËÌÅÒÉ

Numune	Max E' (MPa)	Max E'' (MPa)	E' (max E'') (MPa)	ÔÁÎ (max E'')	T_g (max E'') (°C)
dĦÌÅÍ	409.0	18.7	397.7	0.047	12.4
NaOH	472.3	23.2	463.7	0.050	18.3

*%ᇱ: ÄÅÐÏÌÁÍÁ ÍÏÄÕÌÕ; %ᇱᇱ: ËÁÙąÐ ÍÏÄÕÌÕ; ÔÁÎ: ÓĘÎÍÅ parametresi; T_g: ÇÅëÉħ ÓąÃÁËÌąøą8

¤ÅËÉÌ υ'ÄÅ ËÏÍÐÏÚÉÔÌÅÒÉÎ ËÁÙąÐ ÍÏÄÕÌÕ ÄÅøÉħÉÍÉ ÖÅÒÉÌÍÉħÔÉÒ8 +ÁÙąÐ ÍÏÄÕÌÕ ÁÚÁÌÍąħÔąÒ8 !ÌËÁÌÉ ÉħÌÅÍ ÇĘÒÍÕħ ËÏÍÐÏÚÉÔÌÅÒÄÅ ËÁÙąÐ ÍÏÄÕÌÕ ÇĘÒÌÍÅËÔÅÄÉÒ8 ¤ÅËÉÌ φ'ÄÁ ÔÁÎ ÓąÃÁËÌąøą ÂÁøÌą ÄÅøÉħÉÍÉ ÖÅÒÉÌÍÉħÔÉÒ8 numunelerin ÔÁÎ ÄÅøÅÒÌÅÒÉ ÂÉÒÂÉÒÉÎÅ ÙÁËÉÎ ÁÌËÁÌÉ ÉħÌÅÍ ÇĘÒÍÕħ ÎÕÍÕÎÅÌÅÒÄÅ ÏÌÄÕøÕ ÇĘÒÌÍÅËÔÅÄÉÒ8



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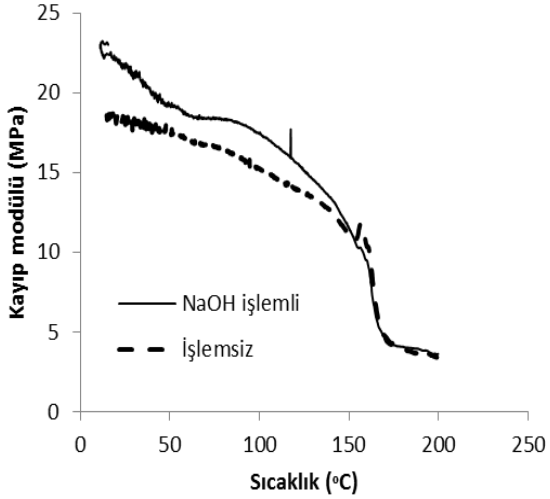

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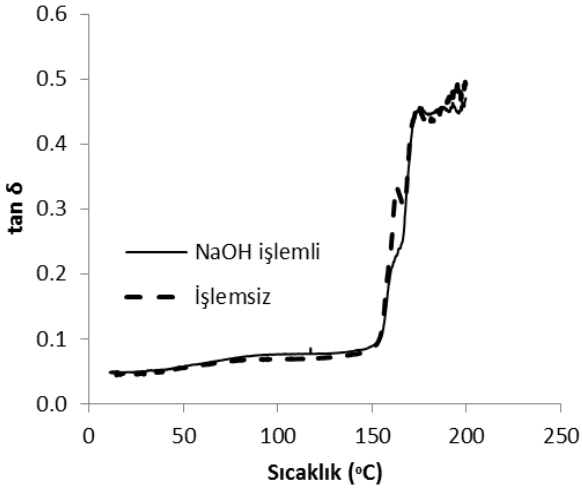
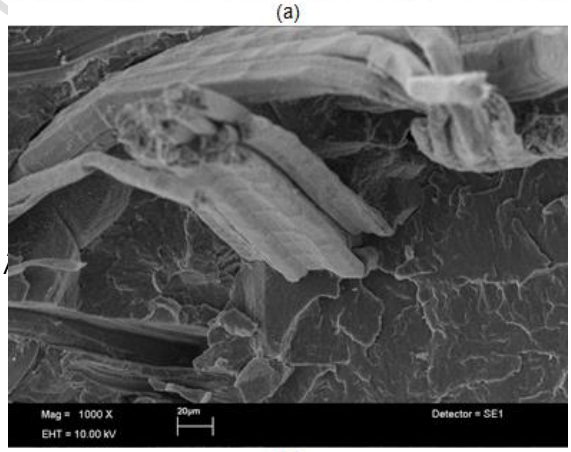


(a)



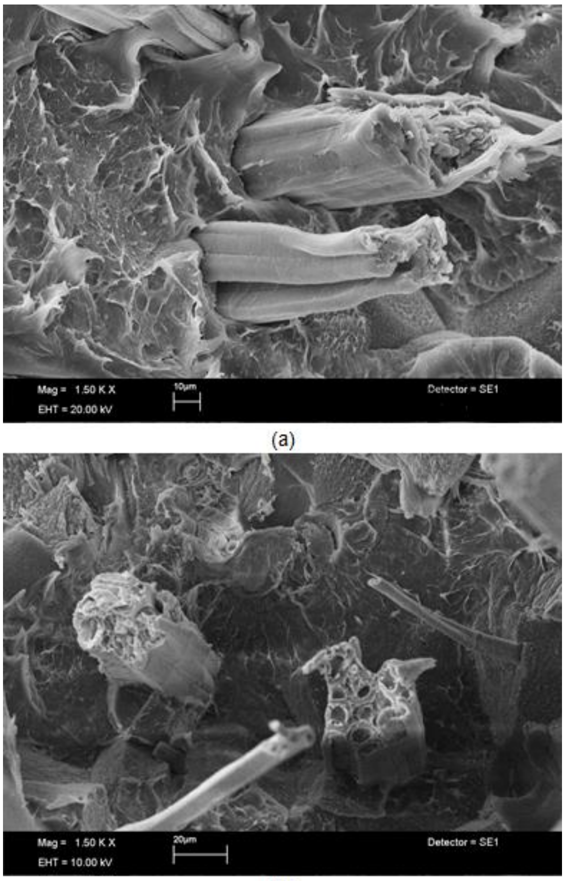
(b)

¤ ÅËÉÌ+ÏÍÐÏÚÉÔ ÁÒÁÙÌÚ 30% -Â ÆÜÌÕÕÌøÅ
ą ÁĄ dhÌÅÍÓÉÚ ą ÂĄ !ÌËÁÌÉ

¤ ÅËÉÌ3ĘÎÌÍÌÅÍÅ ÐÁÒÁÍÅÔÒÅÓÉÎÉÎ ÓąÃÁËÌąøÁ ÂÁøÌą ÄÅøÉhÉÍÉ8

¤ ÅËÉÌ ÓÁÎÄÖÉë ËÏÍÐÏÚÉÔÌÅÒÉÎ ρπππØ ÂÌÙÌÔÍÅÄÅ ÌÉÆÙÍÁÔÒÉÓ ÁÒÁÙÌÚÌ ĘÒÌÌÍÅËÔÅÄÉÒ8 'ĘÒÌÌÄÌøÌ ÇÉÂÉ ÉhÌÅÍÓÉÚ ÎÕÍÕÎÅÌÅÒÁ ĘÒÅ ą ÁĄ ÁÌËÁÌÉ ÉhÌÅÍÌÉ ÎÕÍÕÎÅÌÅÒÄÅ

(b) lif/ÇąÉÎ



¤ÅËÉÌ + ÏÍÐÏÚÉÔ ÁÒÁÙÌÚ 3%- ÆÏÔÏøÒÁÆÌÁÒÁ
ȷÁɊ dĥÌÅÍÓÉÚ ȷÂɊ !ÌÉÁÌÉ Éĥ ÌÅÍÓÉÚ

4 3ÏÎÕë ÌÁÒ

Bu ëÁÌąĥÍÁÄÁ ÄÏËÕÓÕÚ ÙÌÚÁÙ ÊÌÔ ÌÉÆÉ polypropylene ÍÁÔÒÉÓ ÉÌÅ ÍÁÔÒÉÓ ÄÏËÕÓÕÚ ÙÌÚÁÙ ÊÌÔ ÌÉÆÉ ÔÁÎÉÍÌÁÒÁË ÅÌÁÓÔÉËÉ ÍÏÄÕÌÅ ÙÁÐĥÌÁÒÁË ÌÉÆ ÍÁÔÒÉÓ ÅÔËÉÌÅÓÉÍÉÎÉÎ birlikte lif/matris ÙÁÐąĥÍÁÓą ÉÌÅ ÄÅÆÏÒÍÁÓÙÏÎ ÉÌÉÓËÉÓÉ SEM analizi ÉÌÅ ÄÅÇÅÒÌÅÎÄÉÒÉÌÍÉÓÔÉÒ.

5 Kaynaklar

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