بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

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كلية العلوم - قسم الكيمياء

" Radiation Synthesis of Silica Aerogel Reinforcement by Polymers as Thermal Insulator Material "

A Thesis

"Submitted for the degree of Master of Science As partial fulfillment for requirements of the master science"

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The present study was designed to prepare aerogels through cross-linked polyacrylamide (PAAm) hydrogel was reported through the use of gamma irradiation technique. Hydrogel obtained from gamma irradiation of acrylamide monomer dissolved in a solution of sodium silicate as a silicon precursor. Various irradiation doses (10 up to 60 kGy) and various acrylamide (AAm) contents (6.25, 9.37, 12.5, and 30%) were utilized in the polymerization process to investigate higher modulus as reinforced silica aerogels of low density. The reinforced Ca-silicate and Al-silicate aerogels can be an outstanding thermal insulating material used for different industrial and space exploration, with their very porous texture. the most easy techniques of mechanical reinforcing result in increased density and thus increased heat conductivity This is due to the requirement to increase the total number of connection sites inside the silica aerogel, which has resulted in an increase in the total amount of material utilised for the manufacturing of the gel matrix. Recent accomplishments include the creation of aerogels with a three-order-of-magnitude increase in maximum compression strength at break while only doubling the density and thermal conductivity. As a result, the goal of this paper is to provide an overview of several approaches for increasing the strength or stiffness of silica aerogel monoliths while reducing their density and thermal conductivity .

List of Abbreviation

NO	Symbol	Abbreviation
1	kGy	Kilo Gray
2	PAAm	Poly acrylamide
3	Ca-Si	Calcium – Silicate
4	Al-Si	Aluminium - Silicate
5	Si-PAAm	Silica polyacrylamide
6	TEM	Transmission electron microscop
7	KD_2	Thermal properties analyzer
8	EVA	Extra-vehicular activity
9	EDL	Entry,descent and landing
10	ATIS	Aerogel thin insulation sheets
11	TEOS	Tetraethyl orthosilicate
12	TMOS	Tetramethyl oxysilane
13	APD	Ambient pressure drying
14	TMCS	Trimethyl chloro silane
15	HMDZ	Hexamethyl disilazane
16	HLP	Hydrophile-lipophile balance
17	ICF	Internal confinement fusion
18	LSTS	Low surface tension solvent
19	MTMS	Methyl trimethoxy silane
20	AGU_S	Aerogel glazing units
21	SCD	Super critical drying
22	CNF	Cellulose nano fiber
23	SF	Silk fibroin
24	EDEX,EDS,SEM	Energy dispersive X-ray analysis
25	SE,BSE,TE	X–ray electromagnetic radition
26	SDD	Silicon-drift detectors
27	FE-SEM	Field emission-scan electron microscop

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