



**SPACESTATION  
LIVE**

1  
00:00:07,990 --> 00:00:06,470  
when the crew not doing these kind of

2  
00:00:10,310 --> 00:00:08,000  
operational events they are of course

3  
00:00:12,870 --> 00:00:10,320  
focused on all the science taking place

4  
00:00:15,030 --> 00:00:12,880  
on board the station and a recent

5  
00:00:17,029 --> 00:00:15,040  
investigation could lead to some new

6  
00:00:19,189 --> 00:00:17,039  
ways to protect robots in the harsh

7  
00:00:21,429 --> 00:00:19,199  
environment of space could also help

8  
00:00:23,910 --> 00:00:21,439  
create better prosthetics for humans on

9  
00:00:27,029 --> 00:00:23,920  
earth our nasa colleague laurie meg sat

10  
00:00:29,429 --> 00:00:27,039  
down with dr lenore rasmussen to talk

11  
00:00:31,589 --> 00:00:29,439  
about how synthetic muscle performed on

12  
00:00:34,150 --> 00:00:31,599  
the space station

13  
00:00:37,830 --> 00:00:34,160

what we learned is that it can withstand

14

00:00:39,350 --> 00:00:37,840

much more exposure on space than we

15

00:00:40,549 --> 00:00:39,360

had initially

16

00:00:42,790 --> 00:00:40,559

hoped for

17

00:00:44,389 --> 00:00:42,800

in part because it was up there for over

18

00:00:46,069 --> 00:00:44,399

a year initially was going to be a

19

00:00:48,470 --> 00:00:46,079

90-day experiment

20

00:00:49,430 --> 00:00:48,480

but it came back on spacex 6 with over a

21

00:00:50,790 --> 00:00:49,440

year

22

00:00:52,869 --> 00:00:50,800

in space

23

00:00:54,389 --> 00:00:52,879

and all the samples it was a duplicate

24

00:00:57,990 --> 00:00:54,399

experiment on earth just like the twin

25

00:00:59,750 --> 00:00:58,000

study but all the samples are intact

26

00:01:02,470 --> 00:00:59,760

there's a slight amount of yellowing in

27

00:01:04,869 --> 00:01:02,480

some of the space samples which can be

28

00:01:07,590 --> 00:01:04,879

indicative of accelerated aging but as

29

00:01:09,270 --> 00:01:07,600

far as their material integrity

30

00:01:11,109 --> 00:01:09,280

their

31

00:01:13,429 --> 00:01:11,119

what we've explored so far this is

32

00:01:15,910 --> 00:01:13,439

ongoing and in the chemistry and the

33

00:01:18,950 --> 00:01:15,920

electoral activity they're working so

34

00:01:21,109 --> 00:01:18,960

we're actually um very happy with the

35

00:01:23,109 --> 00:01:21,119

results we have so far what were you

36

00:01:25,510 --> 00:01:23,119

hoping to find what were we really

37

00:01:27,030 --> 00:01:25,520

looking for there there were indications

38

00:01:29,190 --> 00:01:27,040

even before i get and began this

39

00:01:31,510 --> 00:01:29,200

experiment that these class of materials

40

00:01:33,590 --> 00:01:31,520

that these are in um

41

00:01:35,910 --> 00:01:33,600

maybe you know inherently radiation

42

00:01:37,830 --> 00:01:35,920

resistant and i had already um when i

43

00:01:40,710 --> 00:01:37,840

was back at princeton had done some

44

00:01:41,510 --> 00:01:40,720

previous extreme temperature conditions

45

00:01:44,230 --> 00:01:41,520

on

46

00:01:47,270 --> 00:01:44,240

the third gen materials anyways

47

00:01:49,109 --> 00:01:47,280

where we took them literally down to

48

00:01:50,870 --> 00:01:49,119

between two and four kelvin and they

49

00:01:52,630 --> 00:01:50,880

took a while to thaw then they worked

50

00:01:54,710 --> 00:01:52,640

fine so we said well these were also

51  
00:01:56,709 --> 00:01:54,720  
radiation resistance i said yeah these

52  
00:01:58,630 --> 00:01:56,719  
could be used for space travel you could

53  
00:01:59,590 --> 00:01:58,640  
even dehydrate them and then hydrate

54  
00:02:01,830 --> 00:01:59,600  
them

55  
00:02:04,550 --> 00:02:01,840  
um you know when you get back so we

56  
00:02:06,310 --> 00:02:04,560  
would use the material for what in space

57  
00:02:08,949 --> 00:02:06,320  
travel you know what they could be used

58  
00:02:11,029 --> 00:02:08,959  
for several things they could be used

59  
00:02:13,830 --> 00:02:11,039  
for human assist

60  
00:02:15,589 --> 00:02:13,840  
on earth and in space a lot of the

61  
00:02:17,350 --> 00:02:15,599  
trying to move when you're all suited up

62  
00:02:19,670 --> 00:02:17,360  
can be very difficult so that could be

63  
00:02:21,990 --> 00:02:19,680

kind of almost kind of kind of tied in

64

00:02:24,150 --> 00:02:22,000

as sort of an exoskeleton fashion and

65

00:02:26,630 --> 00:02:24,160

also offer protection as the at the same

66

00:02:29,350 --> 00:02:26,640

time these are force attenuating

67

00:02:31,509 --> 00:02:29,360

my goal is to bridge form and function

68

00:02:35,830 --> 00:02:31,519

initially how it got me into the space

69

00:02:37,750 --> 00:02:35,840

was prosthetics to make a life like

70

00:02:41,110 --> 00:02:37,760

hand if you will that was also

71

00:02:42,390 --> 00:02:41,120

affordable this also has got we've

72

00:02:46,470 --> 00:02:42,400

received a lot of attention in the

73

00:02:48,390 --> 00:02:46,480

robotics community and for a lot of

74

00:02:51,110 --> 00:02:48,400

a lot of motions that we find very

75

00:02:53,270 --> 00:02:51,120

intuitively easy is actually somewhat

76

00:02:55,509 --> 00:02:53,280

difficult for for a standard gripper

77

00:02:57,430 --> 00:02:55,519

you're turning a knob and stuff and

78

00:03:00,630 --> 00:02:57,440

whether it's on space where there's a

79

00:03:02,710 --> 00:03:00,640

lot it's a very challenging environment

80

00:03:04,470 --> 00:03:02,720

we do want to explore that environment

81

00:03:06,470 --> 00:03:04,480

and there are a lot of situations where

82

00:03:09,030 --> 00:03:06,480

you can't put a human

83

00:03:11,509 --> 00:03:09,040

so we would see then maybe a robot

84

00:03:13,670 --> 00:03:11,519

coated with this made of this could be a

85

00:03:15,190 --> 00:03:13,680

glove or an external device coated with

86

00:03:17,589 --> 00:03:15,200

this where it's kind of assisting with

87

00:03:19,990 --> 00:03:17,599

the motion and also providing protection

88

00:03:21,910 --> 00:03:20,000

that's the other thing i'm looking at

89

00:03:23,750 --> 00:03:21,920

from your background you know you were

90

00:03:24,710 --> 00:03:23,760

looking at prosthetics and things like

91

00:03:26,309 --> 00:03:24,720

that

92

00:03:28,949 --> 00:03:26,319

and then you have the opportunity to

93

00:03:31,509 --> 00:03:28,959

have a space station experiment

94

00:03:33,589 --> 00:03:31,519

what's that been like in floor that

95

00:03:36,710 --> 00:03:33,599

we're using almost like military

96

00:03:38,789 --> 00:03:36,720

precision but all of humanity is working

97

00:03:43,910 --> 00:03:38,799

together on this instead of against one

98

00:03:47,990 --> 00:03:46,470

movement and work and coordination and

99

00:03:52,149 --> 00:03:48,000

with the international truly