MATTHEW LYNCH, PH.D.
THE PROCTER AND GAMBLE COMPANY
CINCINNATI, OHIO

1
00:00:01,400 --> 00:00:03,636
>> And right now we're
ready for our interview,

2
00:00:03,636 --> 00:00:08,908
and we'll welcome Matt Lynch
to Space Station Live today.

3
00:00:08,908 --> 00:00:11,343
Welcome aboard the
International Space Station

4
00:00:11,343 --> 00:00:13,179
and into Mission Control, Matt.

5
00:00:13,179 --> 00:00:14,513
>> Well thank you, Kelly.

6
00:00:14,513 --> 00:00:17,016
It's very nice nice to be
here with you this afternoon.

7
00:00:17,016 --> 00:00:18,818
>> Well, we've already
kind of given a preview

8
00:00:18,818 --> 00:00:20,886
of the experiment that
you are working with

9
00:00:20,886 --> 00:00:23,289
and that the crew aboard the
space station has been working

10
00:00:23,289 --> 00:00:25,091
with this week.

11
00:00:25,091 --> 00:00:27,693
Tell us a little bit about the

experiment you're working on.

12
00:00:27,693 --> 00:00:29,028
>> Sure, sure.

13
00:00:29,028 --> 00:00:30,129
Let me give you a little bit
of background to start with.

14
00:00:30,129 --> 00:00:32,565
Most of the nuclear
products that we make,

15
00:00:32,565 --> 00:00:35,301
they contain very very small
micron-sized particles.

16
00:00:35,301 --> 00:00:37,503
It helps to make
the product stable.

17
00:00:37,503 --> 00:00:39,238
These particles are
really, really small.

18
00:00:39,238 --> 00:00:41,040
And in fact, they're about
the size of a pinhead

19
00:00:41,040 --> 00:00:44,009
or even smaller, and so we
need microscopes to see them.

20
00:00:44,009 --> 00:00:46,145
But what we're trying to do
is structure them correctly,

21
00:00:46,145 --> 00:00:48,848
and if they assemble themselves
into these small structures,

22
00:00:48,848 --> 00:00:50,249
can weave their way
through that liquid

23
00:00:50,249 --> 00:00:53,586
and help prevent separation
such as settling of large drops

24
00:00:53,586 --> 00:00:55,988
and particles that we try
to put into these products.

25
00:00:55,988 --> 00:00:57,990
And we call these
assembled structures strands.

26
00:00:57,990 --> 00:01:00,025
And if done correctly
the strands have

27
00:01:00,025 --> 00:01:00,793
certain characteristics.

28
00:01:00,793 --> 00:01:02,128
They have a width.

29
00:01:02,128 --> 00:01:04,029
They have a length, and we
like to maintain those strands

30
00:01:04,029 --> 00:01:05,931
over long periods of time,

31
00:01:05,931 --> 00:01:09,001
typically for months,
for years for us.

32
00:01:09,001 --> 00:01:11,303

At the same time, we're going
to set these up and we're going

33
00:01:11,303 --> 00:01:12,538
to keep them together.

34
00:01:12,538 --> 00:01:14,206
There are processes
such as Brownian motion,

35
00:01:14,206 --> 00:01:15,641
and these are kind of those
little thermal jiggles

36
00:01:15,641 --> 00:01:17,810
that you see where small
particles tend to move,

37
00:01:17,810 --> 00:01:19,979
and it has the effect
of basically moving all

38
00:01:19,979 --> 00:01:22,448
of these particles around,
changing the strands on us,

39
00:01:22,448 --> 00:01:24,683
and you know really we don't
understand the physics behind

40
00:01:24,683 --> 00:01:27,186
that and current theories
are lacking, so for us

41
00:01:27,186 --> 00:01:30,556
and for the community at large,
it's really hard to be able

42
00:01:30,556 --> 00:01:33,526
to control and develop

systems in predictable ways

43
00:01:33,526 --> 00:01:35,728
because we don't understand
how to do this correctly.

44
00:01:35,728 --> 00:01:37,396
So, in our experiment
that we're doing

45
00:01:37,396 --> 00:01:39,498
for the ACE we have
these mixtures.

46
00:01:39,498 --> 00:01:41,467
They're kind of idealized
particles.

47
00:01:41,467 --> 00:01:42,701
We keep large ones.

48
00:01:42,701 --> 00:01:43,936
We keep small ones together.

49
00:01:43,936 --> 00:01:45,771
This kind of reflects
somewhat the reality

50
00:01:45,771 --> 00:01:48,040
of the commercial
mixtures that we deal with.

51
00:01:48,040 --> 00:01:50,676
These mixtures are placed
into small cylindrical cells,

52
00:01:50,676 --> 00:01:53,245
and those are mounted on
microscopes so we can see them.

53
00:01:53,245 --> 00:01:55,414
And the large and small
particles can be magnified

54
00:01:55,414 --> 00:01:56,815
with the scope.

55
00:01:56,815 --> 00:01:58,651
Then we have fluorescent tags
on each of them so we can look

56
00:01:58,651 --> 00:02:00,719
at the small ones
independent of the large ones

57
00:02:00,719 --> 00:02:02,788
and ask how they assemble
into those strands

58
00:02:02,788 --> 00:02:04,256
and how they move over time.

59
00:02:04,256 --> 00:02:07,593
So, for example, I think I have
a picture here that is taken,

60
00:02:07,593 --> 00:02:09,195
actually some laboratories
at Harvard

61
00:02:09,195 --> 00:02:10,529
with some of our colleagues.

62
00:02:10,529 --> 00:02:12,498
You see green ones which
are kind of big and red ones

63
00:02:12,498 --> 00:02:13,899
that are kind of small.

64
00:02:13,899 --> 00:02:16,101
You see the strands on the left
side that are all put together,

65
00:02:16,101 --> 00:02:19,104
and that forms the
stability in our product.

66
00:02:19,104 --> 00:02:20,406
And so with the experiments

67
00:02:20,406 --> 00:02:22,041
in general what we do is we
actually have an astronaut

68
00:02:22,041 --> 00:02:24,343
who comes in and tries
to randomize the sample.

69
00:02:24,343 --> 00:02:27,646
Inside that little
cylindrical cell is a stir bar.

70
00:02:27,646 --> 00:02:30,049
We take the stir
bar by a magnet.

71
00:02:30,049 --> 00:02:31,650
He moves that stir
bar back and forth,

72
00:02:31,650 --> 00:02:34,119
and that takes the samples,
breaks up all those strands

73
00:02:34,119 --> 00:02:36,188
that you see there and
the sample is randomized.

74
00:02:36,188 --> 00:02:39,325
And then what we do is we
watch that structure redevelop

75
00:02:39,325 --> 00:02:42,761
into those strands, and
we ask over time how

76
00:02:42,761 --> 00:02:44,463
that sample then
begins to change,

77
00:02:44,463 --> 00:02:46,765
and so how the individual
particles move.

78
00:02:46,765 --> 00:02:48,267
How the strands move.

79
00:02:48,267 --> 00:02:50,669
And that gives us the insight
and the data that we need then

80
00:02:50,669 --> 00:02:52,238
to develop our theories.

81
00:02:52,238 --> 00:02:57,176
>> So how does microgravity
make your experiment possible?

82
00:02:57,176 --> 00:02:58,344
>> Yeah, so it's
kind of critical.

83
00:02:58,344 --> 00:02:59,445
So let me use that
same picture to kind

84
00:02:59,445 --> 00:03:00,713

of illustrate this for you.

85
00:03:00,713 --> 00:03:02,348
So on the left side
is the strands

86
00:03:02,348 --> 00:03:04,250
after we totally
mix the sample up.

87
00:03:04,250 --> 00:03:06,518
This was done again
on earth in gravity.

88
00:03:06,518 --> 00:03:08,587
You see the red, and
you see the green.

89
00:03:08,587 --> 00:03:10,923
And you see that there's a
lot of material in that field

90
00:03:10,923 --> 00:03:12,391
of view that we can measure.

91
00:03:12,391 --> 00:03:15,527
And what will happen is that
over about 5 minutes' timeframe,

92
00:03:15,527 --> 00:03:16,662
you see the picture
on the right.

93
00:03:16,662 --> 00:03:18,597
And the picture on the
right doesn't show much

94
00:03:18,597 --> 00:03:19,832
in the way of mass at all.

95
00:03:19,832 --> 00:03:21,700
And it's not as if we're
creating or destroying mass.

96
00:03:21,700 --> 00:03:24,136
What's happening is that
mass is settling out on us.

97
00:03:24,136 --> 00:03:25,904
And so if we try to measure

98
00:03:25,904 --> 00:03:29,742
over long time periods how
these structures are evolving,

99
00:03:29,742 --> 00:03:32,044
I really can't do that
because they are settling

100
00:03:32,044 --> 00:03:35,247
and making all the changes
that we see in those pictures.

101
00:03:35,247 --> 00:03:37,316
So recall that we're
looking at this over,

102
00:03:37,316 --> 00:03:39,218
or thinking about these
changes over the course

103
00:03:39,218 --> 00:03:41,086
of days, months, years.

104
00:03:41,086 --> 00:03:42,755
Five minutes on earth
[inaudible].

105
00:03:42,755 --> 00:03:45,024

So really microgravity is
critical for us in order

106
00:03:45,024 --> 00:03:46,625
to do these kinds of
experiments, get the data

107
00:03:46,625 --> 00:03:48,927
that we need to develop
these theories.

108
00:03:48,927 --> 00:03:52,798
>> Well so, you know, on earth
with gravity, if you have a can

109
00:03:52,798 --> 00:03:55,367
of paint or stuff,
you have to mix it

110
00:03:55,367 --> 00:03:57,336
up really good before
you go off to use it

111
00:03:57,336 --> 00:03:59,471
if you've let it
sit for a while.

112
00:03:59,471 --> 00:04:01,407
What in simple terms
are you trying to learn

113
00:04:01,407 --> 00:04:03,442
about these things
in microgravity?

114
00:04:03,442 --> 00:04:06,078
>> Yep, so from our perspective,
we've got product designers,

115
00:04:06,078 --> 00:04:08,113

and what they want to do is
they want to be able to choose

116
00:04:08,113 --> 00:04:09,648
in a sense those particles.

117
00:04:09,648 --> 00:04:12,418
Here we show them as red and
green, but for us there's kind

118
00:04:12,418 --> 00:04:14,219
of a pallet of things
that we could use.

119
00:04:14,219 --> 00:04:17,022
And what one would
want to do is be able

120
00:04:17,022 --> 00:04:20,326
to design the right pallet,
use the right tools in a sense

121
00:04:20,326 --> 00:04:22,227
to make that work
in given products.

122
00:04:22,227 --> 00:04:23,862
Right now it's kind of a
trial and error process.

123
00:04:23,862 --> 00:04:25,097
You know, we go through them.

124
00:04:25,097 --> 00:04:26,532
We try to, and you can
think about paints as well,

125
00:04:26,532 --> 00:04:29,001
but you can go through and you
try to pick the right flavors

126
00:04:29,001 --> 00:04:31,704
or colors, the right sizes
to make it all work right.

127
00:04:31,704 --> 00:04:34,273
The problem tends to be that
it takes a very long time.

128
00:04:34,273 --> 00:04:36,408
If you think of all the
permutations of things

129
00:04:36,408 --> 00:04:39,345
that you might pick, and then
you have to measure these

130
00:04:39,345 --> 00:04:40,779
over long periods of time.

131
00:04:40,779 --> 00:04:43,682
So even the paints settling
example, you have to wait,

132
00:04:43,682 --> 00:04:45,517
let the pain sit around
for months to know whether

133
00:04:45,517 --> 00:04:48,320
or not you have something
that works reasonably well.

134
00:04:48,320 --> 00:04:50,155
And even if you spend that
time, there's no guarantee

135
00:04:50,155 --> 00:04:52,157
that it works, and so
really what we're hoping

136
00:04:52,157 --> 00:04:54,159
to learn is basically
the fundamental rules

137
00:04:54,159 --> 00:04:56,328
that govern the formation
of these structures,

138
00:04:56,328 --> 00:04:58,530
how those structures change
over time, and by doing

139
00:04:58,530 --> 00:05:02,167
so we can make a much
better directed experiment

140
00:05:02,167 --> 00:05:04,136
and more rational
design of our products.

141
00:05:04,136 --> 00:05:06,238
All right.

142
00:05:06,238 --> 00:05:06,805
>> So.

143
00:05:06,805 --> 00:05:08,040
>> Um hum?

144
00:05:08,040 --> 00:05:10,209
>> So, Matt, I understand
you guys were on a bit

145
00:05:10,209 --> 00:05:12,945
of a break this week,
but you have been working

146
00:05:12,945 --> 00:05:13,812
through a number of samples.

147
00:05:13,812 --> 00:05:15,114
Tell us a little bit about that.

148
00:05:15,114 --> 00:05:17,116
>> Yeah, well for the
break, the break is not

149
00:05:17,116 --> 00:05:19,318
as if there are any issues
with the project per se.

150
00:05:19,318 --> 00:05:21,987
It turns out, and I don't
know all the details honestly,

151
00:05:21,987 --> 00:05:24,590
but it turns out that the
orientation of the station,

152
00:05:24,590 --> 00:05:27,459
its electrical panels that
are light and solar panels

153
00:05:27,459 --> 00:05:29,595
that collect all
the electricity,

154
00:05:29,595 --> 00:05:30,996
they have to be oriented
in such a way

155
00:05:30,996 --> 00:05:33,098
that the antenna can
actually transmit data back

156
00:05:33,098 --> 00:05:34,266
down to earth.

157

00:05:34,266 --> 00:05:35,768
Right now over the course
of this week they're

158
00:05:35,768 --> 00:05:38,537
in an orientation that
then kind of prevents them

159
00:05:38,537 --> 00:05:40,873
from sending a transmission
efficiently,

160
00:05:40,873 --> 00:05:42,641
at least for our facilities.

161
00:05:42,641 --> 00:05:45,043
So we actually through the
last number of experiments

162
00:05:45,043 --> 00:05:46,311
that we've done, we've
been doing these probably

163
00:05:46,311 --> 00:05:47,746
for about 3 or 4 months now.

164
00:05:47,746 --> 00:05:49,248
We've collected a lot
of interesting data.

165
00:05:49,248 --> 00:05:52,217
We actually have had some
really unexpected results,

166
00:05:52,217 --> 00:05:54,353
and it led us to
really think a lot

167
00:05:54,353 --> 00:05:55,721
about how we're doing

our experiments,

168
00:05:55,721 --> 00:05:56,789
how we're doing our
measurements,

169
00:05:56,789 --> 00:05:58,157
how our optics are set up.

170
00:05:58,157 --> 00:06:00,292
So the break is actually a
good opportunity right now

171
00:06:00,292 --> 00:06:03,929
to gather all that information
together, try to figure out how

172
00:06:03,929 --> 00:06:06,365
to make our experiments
even better.

173
00:06:06,365 --> 00:06:08,767
I would point out that we are
really the first of a number

174
00:06:08,767 --> 00:06:12,371
of certain experiments
fort ACE program itself,

175
00:06:12,371 --> 00:06:14,940
and so in many ways we're
trying to figure out how

176
00:06:14,940 --> 00:06:16,308
to make all these things work.

177
00:06:16,308 --> 00:06:19,578
So the break is a fantastic
time to just take a good breath,

178
00:06:19,578 --> 00:06:22,114
make sure we get all of
our measurements correct.

179
00:06:22,114 --> 00:06:23,382
>> And what's your background?

180
00:06:23,382 --> 00:06:24,149
Where are you from?

181
00:06:24,149 --> 00:06:25,651
Where'd you go to school?

182
00:06:25,651 --> 00:06:28,921
Where do you work now and how
does that help get you involved

183
00:06:28,921 --> 00:06:30,456
in the space station research?

184
00:06:30,456 --> 00:06:32,825
>> Well, yeah, so, you know
it's interesting, I guess.

185
00:06:32,825 --> 00:06:35,093
I mean, I grew up in New
England and spent a few years

186
00:06:35,093 --> 00:06:36,428
in high school in Virginia.

187
00:06:36,428 --> 00:06:39,531
And I could remember through
that time, and I don't know

188
00:06:39,531 --> 00:06:41,700
if you're old enough for this
or not, but there was a series

189
00:06:41,700 --> 00:06:44,670
from Carl Sagan, who used to
talk about the cosmos, billions

190
00:06:44,670 --> 00:06:45,871
and billions of things,

191
00:06:45,871 --> 00:06:47,406
and it kind of gets people
interested in science.

192
00:06:47,406 --> 00:06:50,509
Always had an interest in
science from that, from there on

193
00:06:50,509 --> 00:06:54,546
and received a degree in
chemistry at Virginia Tech,

194
00:06:54,546 --> 00:06:57,049
a PhD in chemistry from
the University of Wisconsin

195
00:06:57,049 --> 00:06:59,551
in Madison, and my
thesis background revealed

196
00:06:59,551 --> 00:07:01,487
around optical physics
and properties

197
00:07:01,487 --> 00:07:03,155
of molecules on surfaces.

198
00:07:03,155 --> 00:07:06,692
Joined P and G about 20 years
ago in research and development,

199
00:07:06,692 --> 00:07:08,861

but along the same lines
maintained real strong

200
00:07:08,861 --> 00:07:09,995
academic ties.

201
00:07:09,995 --> 00:07:12,798
In fact, to hold adjunct
positions at Cincinnati

202
00:07:12,798 --> 00:07:15,667
and adjunct position in chemical
engineering at University

203
00:07:15,667 --> 00:07:17,836
of Delaware, and what this
does for you is it allows you

204
00:07:17,836 --> 00:07:20,272
to take otherwise
really, really complicated

205
00:07:20,272 --> 00:07:24,877
and sophisticated problems that
we deal with in an industry,

206
00:07:24,877 --> 00:07:26,478
and we can tie it
and work it together

207
00:07:26,478 --> 00:07:27,813
with our academic partners.

208
00:07:27,813 --> 00:07:29,081
And then through
those partnerships

209
00:07:29,081 --> 00:07:32,117
that we had then the opportunity
to work with NASA again.

210
00:07:32,117 --> 00:07:37,022
I got introduced to NASA and
got into the ACE program.

211
00:07:37,022 --> 00:07:39,091
>> So you know a
legitimate question

212
00:07:39,091 --> 00:07:41,693
of tax payers is
what's in it for me.

213
00:07:41,693 --> 00:07:45,297
How can you apply
your research results

214
00:07:45,297 --> 00:07:48,200
to benefit people
here back on earth?

215
00:07:48,200 --> 00:07:50,135
>> Yeah, I think this
is really quite simple.

216
00:07:50,135 --> 00:07:51,670
You know, we as a
company make products

217
00:07:51,670 --> 00:07:54,840
that are designed really to
include the quality of life just

218
00:07:54,840 --> 00:07:56,909
of ordinary people,
and all the things

219
00:07:56,909 --> 00:07:58,744
that we're learning here
help us bring more products,

220
00:07:58,744 --> 00:08:01,547
better products, detergents,
shampoos, fabric conditioners,

221
00:08:01,547 --> 00:08:03,682
things like this, to
increase the quality

222
00:08:03,682 --> 00:08:05,050
of life for those people.

223
00:08:05,050 --> 00:08:06,952
And I would also point out that
the science that we're doing

224
00:08:06,952 --> 00:08:08,587
as well is very basic science,

225
00:08:08,587 --> 00:08:13,492
and so it helps the academic
world to grow their basis

226
00:08:13,492 --> 00:08:14,860
of understanding of
materials as well.

227
00:08:14,860 --> 00:08:18,063
So on both levels
I think it's great.

228
00:08:18,063 --> 00:08:20,666
>> Well, Matt Lynch from Proctor
and Gamble in Cincinnati.

229
00:08:20,666 --> 00:08:24,069
Thank you so much for joining
us, a principal investigator

230

00:08:24,069 --> 00:08:27,139
for the advanced
colloids experiment.

231
00:08:27,139 --> 00:08:30,175
We wish you a lot of good
luck and good data gathering

232
00:08:30,175 --> 00:08:32,044
with your experiment
and look forward

233
00:08:32,044 --> 00:08:34,313
to a progress report
in the future.

234
00:08:34,313 --> 00:08:35,247
>> Fantastic, Kelly.

235
00:08:35,247 --> 00:08:35,948
It was a pleasure
talking to you.

236
00:08:35,948 --> 00:08:37,282
Thank you for your time.

237
00:08:37,282 --> 00:08:38,050
>> Thank you.

238
00:08:38,050 --> 00:08:41,353
>> Okay, bye bye.

239
00:08:41,353 --> 00:08:43,956
>> Again, that was Matt Lynch
from Proctor and Gamble,

240
00:08:43,956 --> 00:08:46,625
who is working with the advanced
colloid experiment aboard the

241
00:08:46,625 --> 00:08:49,161
International Space
Station looking

242
00:08:49,161 --> 00:08:53,365
at how small particles suspended
in fluids that are used

243
00:08:53,365 --> 00:08:57,135
in our everyday lives in
many different ways react

244
00:08:57,135 --> 00:09:00,672
in microgravity, bringing
that fundamental research back