

# Developing the Next-Generation Space Suit for the Moon and Mars



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SPACE SUIT ENGINEER  
NASA JOHNSON SPACE CENTER













Credit: Oleg Artemyev



























Thermal-insulated garment liner (purple fabric)

Thermal-insulated  
garment insulation  
multi-layer aluminum (Mylar)

Standard recommended garment liner

Thermoplastic coated ripstop material

Reinforced Crotch

Reinforced garment material (purple fabric)

Reinforced garment material (purple fabric)

Reinforced garment material (purple fabric)

SUIT  
PRESS  
PULL

1 2 3 4 5













Credit: Smithsonian Institution









Photo: Ross Lockwood

Disclaimer: Not a real space suit!

THE MARTIAN



Photo: 20<sup>th</sup> Century Fox

Disclaimer: Not a real space suit!



THE MARTIAN

Credit: 20<sup>th</sup> Century Fox  
Disclaimer: Not a real space suit!

# A suit made for moon walking

Armstrong's American flag planted on the lunar surface. Astronauts return from the moon to physicians from the textile manufacturer by a 27-year industrial-scale effort involving a materials developed by Dr. Rose.





**AMERICA'S MOST ACTIVE WOMEN CHOOSE  
PLANTER'S PARTY CIGARS!**

These results demonstrate that both the *in vitro* and *in vivo* models can be used to study the effects of various treatments on the development of the disease.



INTRODUCING

# Playtex *living* Bra

Now...the designers who performed such miracles with Playtex Girdles  
bring you an exciting new box of classic and nylon!



Exclusive  
cross-cross side  
self-adjust  
for Fabulous Fit!

Scallopized Nylon  
gently  
cup and nipp!

Cross-cross elastic  
front stays low,  
stays firmly!

Elastic back  
sets down  
and stays lower!



Credit: ILC Dover



Credit: ILC Dover





Credit: ILC Dover

Category	Year	Value	Description	Year	Value
1990	1990	\$1.00	Initial Investment	1991	\$1.00
1991	1991	\$1.04	1st Year Interest	1992	\$1.04
1992	1992	\$1.08	2nd Year Interest	1993	\$1.08
1993	1993	\$1.12	3rd Year Interest	1994	\$1.12
1994	1994	\$1.16	4th Year Interest	1995	\$1.16
1995	1995	\$1.20	5th Year Interest	1996	\$1.20
1996	1996	\$1.24	6th Year Interest	1997	\$1.24
1997	1997	\$1.28	7th Year Interest	1998	\$1.28
1998	1998	\$1.32	8th Year Interest	1999	\$1.32
1999	1999	\$1.36	9th Year Interest	2000	\$1.36
2000	2000	\$1.40	10th Year Interest	2001	\$1.40
2001	2001	\$1.44	11th Year Interest	2002	\$1.44
2002	2002	\$1.48	12th Year Interest	2003	\$1.48
2003	2003	\$1.52	13th Year Interest	2004	\$1.52
2004	2004	\$1.56	14th Year Interest	2005	\$1.56
2005	2005	\$1.60	15th Year Interest	2006	\$1.60
2006	2006	\$1.64	16th Year Interest	2007	\$1.64
2007	2007	\$1.68	17th Year Interest	2008	\$1.68
2008	2008	\$1.72	18th Year Interest	2009	\$1.72
2009	2009	\$1.76	19th Year Interest	2010	\$1.76
2010	2010	\$1.80	20th Year Interest	2011	\$1.80
2011	2011	\$1.84	21st Year Interest	2012	\$1.84
2012	2012	\$1.88	22nd Year Interest	2013	\$1.88
2013	2013	\$1.92	23rd Year Interest	2014	\$1.92
2014	2014	\$1.96	24th Year Interest	2015	\$1.96
2015	2015	\$2.00	25th Year Interest	2016	\$2.00
2016	2016	\$2.04	26th Year Interest	2017	\$2.04
2017	2017	\$2.08	27th Year Interest	2018	\$2.08
2018	2018	\$2.12	28th Year Interest	2019	\$2.12
2019	2019	\$2.16	29th Year Interest	2020	\$2.16
2020	2020	\$2.20	30th Year Interest	2021	\$2.20
2021	2021	\$2.24	31st Year Interest	2022	\$2.24
2022	2022	\$2.28	32nd Year Interest	2023	\$2.28
2023	2023	\$2.32	33rd Year Interest	2024	\$2.32
2024	2024	\$2.36	34th Year Interest	2025	\$2.36
2025	2025	\$2.40	35th Year Interest	2026	\$2.40
2026	2026	\$2.44	36th Year Interest	2027	\$2.44
2027	2027	\$2.48	37th Year Interest	2028	\$2.48
2028	2028	\$2.52	38th Year Interest	2029	\$2.52
2029	2029	\$2.56	39th Year Interest	2030	\$2.56
2030	2030	\$2.60	40th Year Interest	2031	\$2.60
2031	2031	\$2.64	41st Year Interest	2032	\$2.64
2032	2032	\$2.68	42nd Year Interest	2033	\$2.68
2033	2033	\$2.72	43rd Year Interest	2034	\$2.72
2034	2034	\$2.76	44th Year Interest	2035	\$2.76
2035	2035	\$2.80	45th Year Interest	2036	\$2.80
2036	2036	\$2.84	46th Year Interest	2037	\$2.84
2037	2037	\$2.88	47th Year Interest	2038	\$2.88
2038	2038	\$2.92	48th Year Interest	2039	\$2.92
2039	2039	\$2.96	49th Year Interest	2040	\$2.96
2040	2040	\$3.00	50th Year Interest	2041	\$3.00
2041	2041	\$3.04	51st Year Interest	2042	\$3.04
2042	2042	\$3.08	52nd Year Interest	2043	\$3.08
2043	2043	\$3.12	53rd Year Interest	2044	\$3.12
2044	2044	\$3.16	54th Year Interest	2045	\$3.16
2045	2045	\$3.20	55th Year Interest	2046	\$3.20
2046	2046	\$3.24	56th Year Interest	2047	\$3.24
2047	2047	\$3.28	57th Year Interest	2048	\$3.28
2048	2048	\$3.32	58th Year Interest	2049	\$3.32
2049	2049	\$3.36	59th Year Interest	2050	\$3.36
2050	2050	\$3.40	60th Year Interest	2051	\$3.40
2051	2051	\$3.44	61st Year Interest	2052	\$3.44
2052	2052	\$3.48	62nd Year Interest	2053	\$3.48
2053	2053	\$3.52	63rd Year Interest	2054	\$3.52
2054	2054	\$3.56	64th Year Interest	2055	\$3.56
2055	2055	\$3.60	65th Year Interest	2056	\$3.60
2056	2056	\$3.64	66th Year Interest	2057	\$3.64
2057	2057	\$3.68	67th Year Interest	2058	\$3.68
2058	2058	\$3.72	68th Year Interest	2059	\$3.72
2059	2059	\$3.76	69th Year Interest	2060	\$3.76
2060	2060	\$3.80	70th Year Interest	2061	\$3.80
2061	2061	\$3.84	71st Year Interest	2062	\$3.84
2062	2062	\$3.88	72nd Year Interest	2063	\$3.88
2063	2063	\$3.92	73rd Year Interest	2064	\$3.92
2064	2064	\$3.96	74th Year Interest	2065	\$3.96
2065	2065	\$4.00	75th Year Interest	2066	\$4.00
2066	2066	\$4.04	76th Year Interest	2067	\$4.04
2067	2067	\$4.08	77th Year Interest	2068	\$4.08
2068	2068	\$4.12	78th Year Interest	2069	\$4.12
2069	2069	\$4.16	79th Year Interest	2070	\$4.16
2070	2070	\$4.20	80th Year Interest	2071	\$4.20
2071	2071	\$4.24	81st Year Interest	2072	\$4.24
2072	2072	\$4.28	82nd Year Interest	2073	\$4.28
2073	2073	\$4.32	83rd Year Interest	2074	\$4.32
2074	2074	\$4.36	84th Year Interest	2075	\$4.36
2075	2075	\$4.40	85th Year Interest	2076	\$4.40
2076	2076	\$4.44	86th Year Interest	2077	\$4.44
2077	2077	\$4.48	87th Year Interest	2078	\$4.48
2078	2078	\$4.52	88th Year Interest	2079	\$4.52
2079	2079	\$4.56	89th Year Interest	2080	\$4.56
2080	2080	\$4.60	90th Year Interest	2081	\$4.60
2081	2081	\$4.64	91st Year Interest	2082	\$4.64
2082	2082	\$4.68	92nd Year Interest	2083	\$4.68
2083	2083	\$4.72	93rd Year Interest	2084	\$4.72
2084	2084	\$4.76	94th Year Interest	2085	\$4.76
2085	2085	\$4.80	95th Year Interest	2086	\$4.80
2086	2086	\$4.84	96th Year Interest	2087	\$4.84
2087	2087	\$4.88	97th Year Interest	2088	\$4.88
2088	2088	\$4.92	98th Year Interest	2089	\$4.92
2089	2089	\$4.96	99th Year Interest	2090	\$4.96
2090	2090	\$5.00	100th Year Interest	2091	\$5.00

西工大精英班教材系列：大学物理实验（第2版）

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第二輯 第二世

ANSWER: It is a strong acid.

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卷之三

#### What's

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就对三者都一视同仁。他们

**CHARTER OF DUTCH AGENCIES** JOHN C. HAMILTON, SECRETARY and EDWARD T. KELLOGG, CHIEF

ANSWER: **EDUCATION** **LEADS TO**  
**EDUCATION** **LEADS TO**

ANSWERING YOUR QUESTIONS / 100 QUESTIONS AND ANSWERS ON THE NEW TESTAMENT

Area: 11-12th Street, Room 20  
Page: 11-12

ПРИМЕЧАНИЕ: АДРЕСА: <http://www.123tovar.ru>, <http://www.123tovar.ru>, <http://www.123tovar.ru>

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卷之三

江蘇省蘇州中學

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441-442

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10 of 10

100

Sample	Initial Length	Final Length
486004	39.0 mm	10.0 mm
148005 LBD	32.0 mm	13.0 mm
TR820A	30.0 mm	11.0 mm
48601004	36.0 mm	11.0 mm

to **Business Park** after  
Business Park.







Credit: Smithsonian Institution





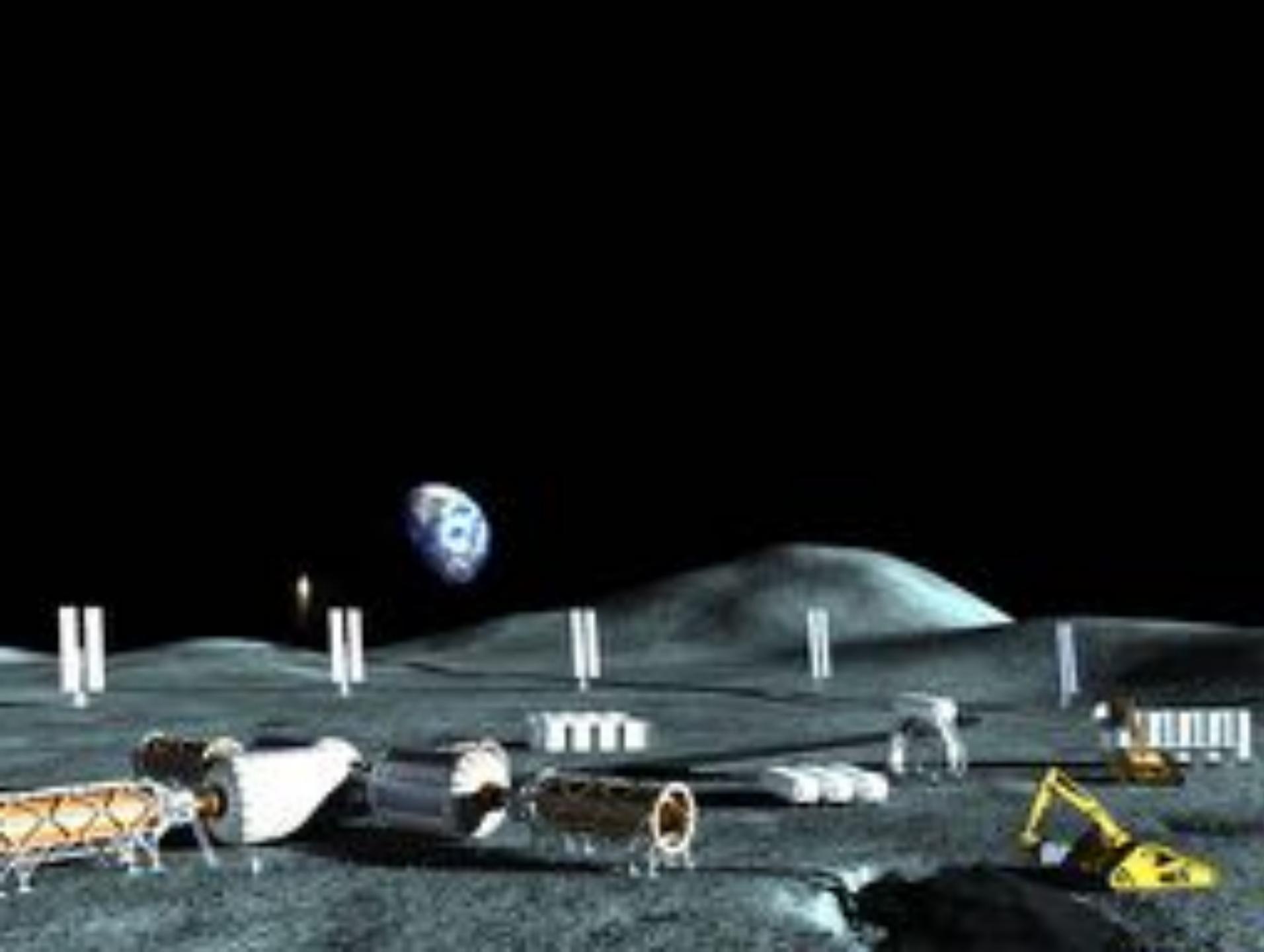


Credit: ESA

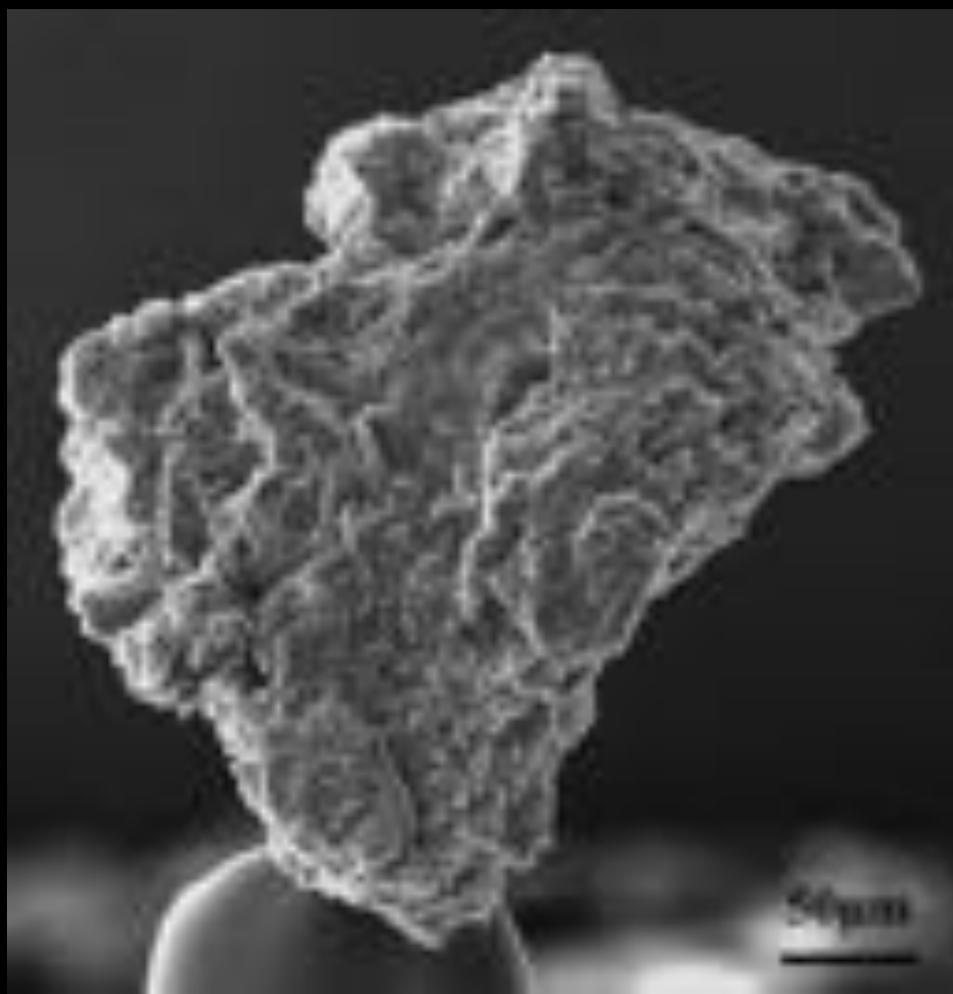




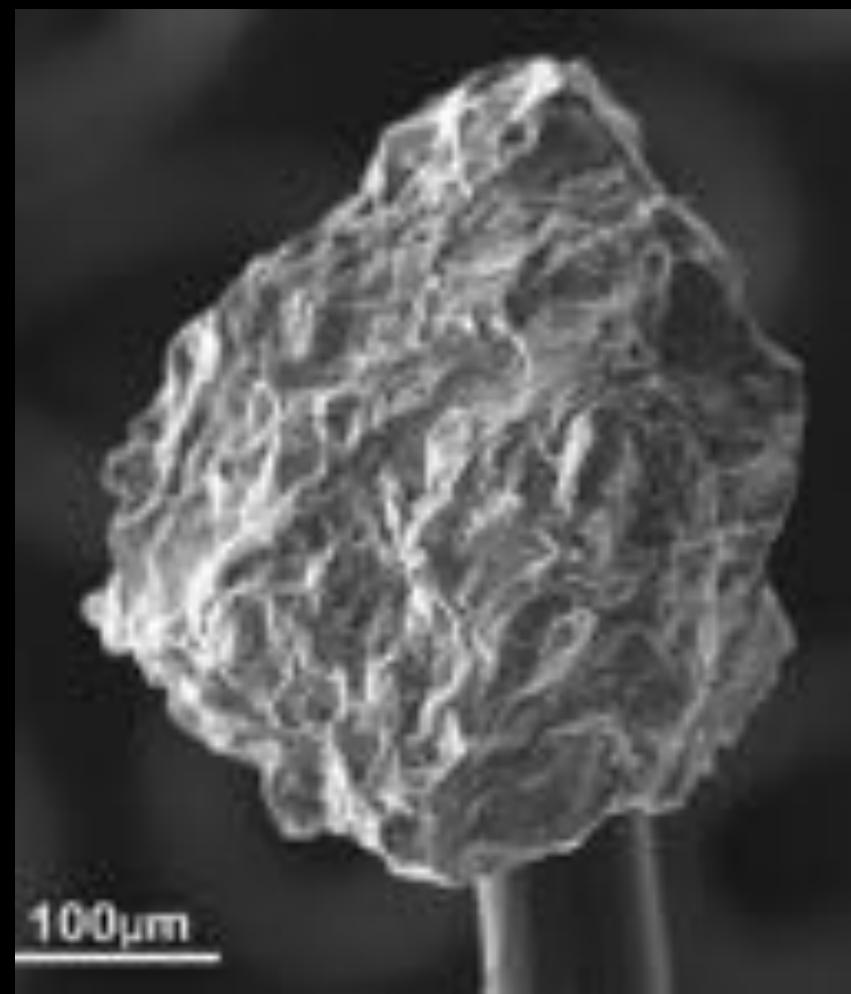






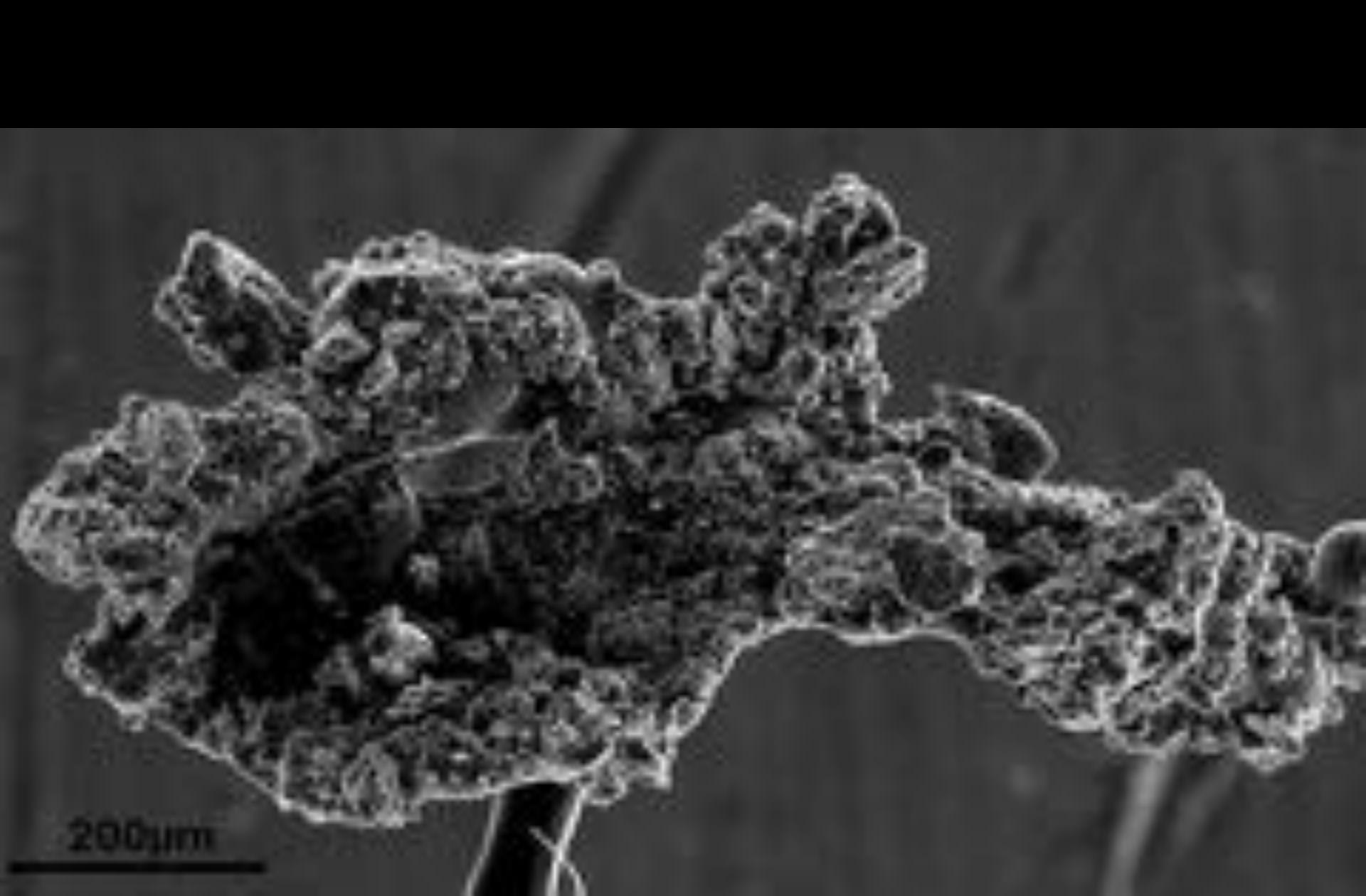


54 $\mu$ m



100 $\mu$ m

Credit: Lehigh University



Credit: Lehigh University















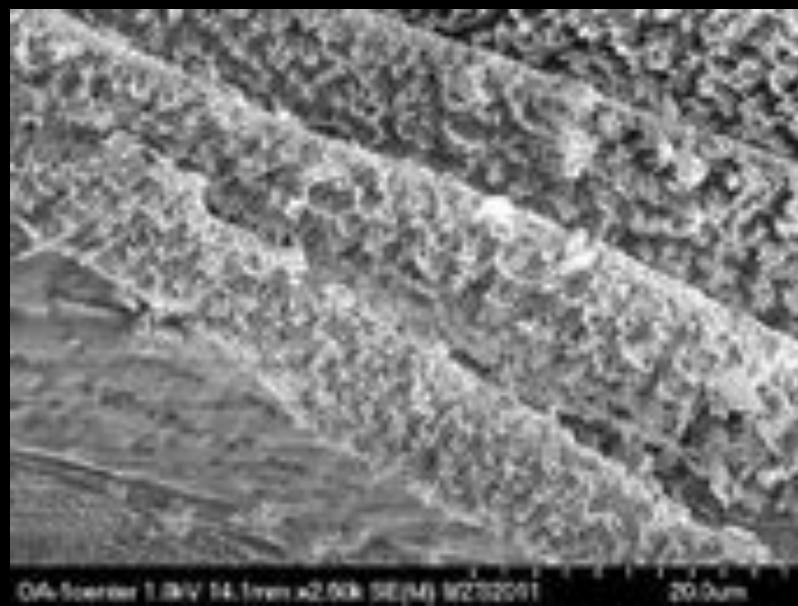
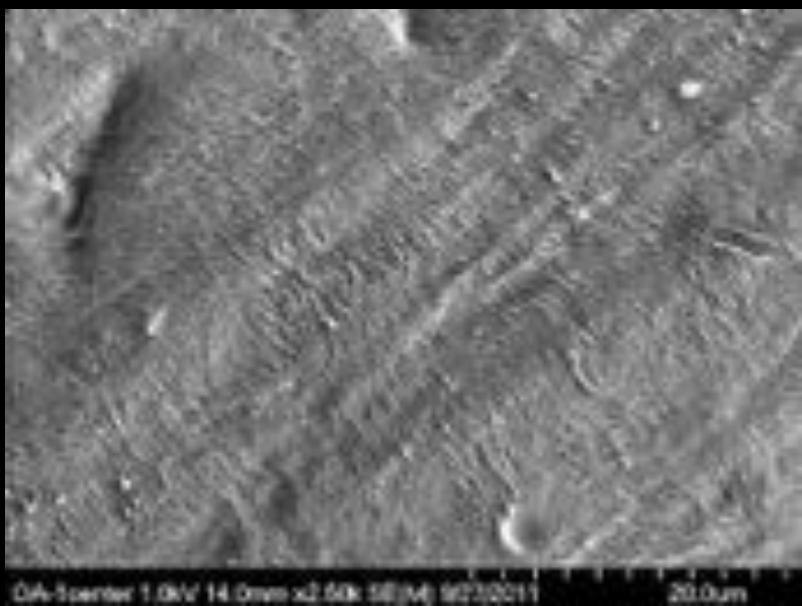
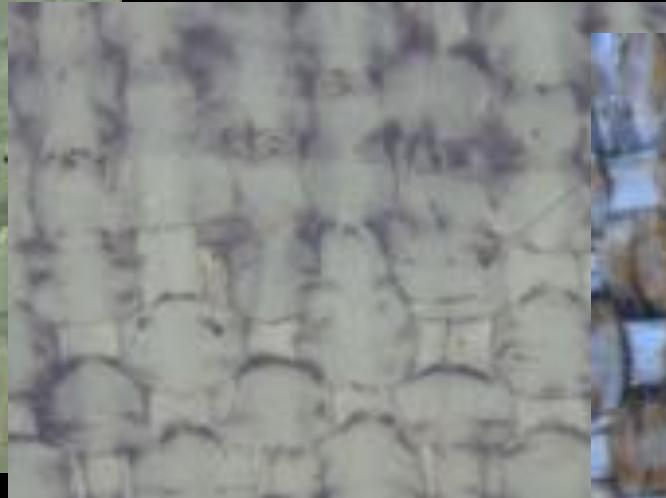
200  $\mu$ m  
Scale bar

EDS = 1.00 kV  
WD = 5.0 mm  
Mag = 50 X

Sample A = S23      width = 2.301 mm  
Reference Mag + Polarized EDS  
Cryo-Focused Beam

Date = 3 Mar 2014  
Scales = 0.05-0.010 m  
Nominal Mag = mag 100X





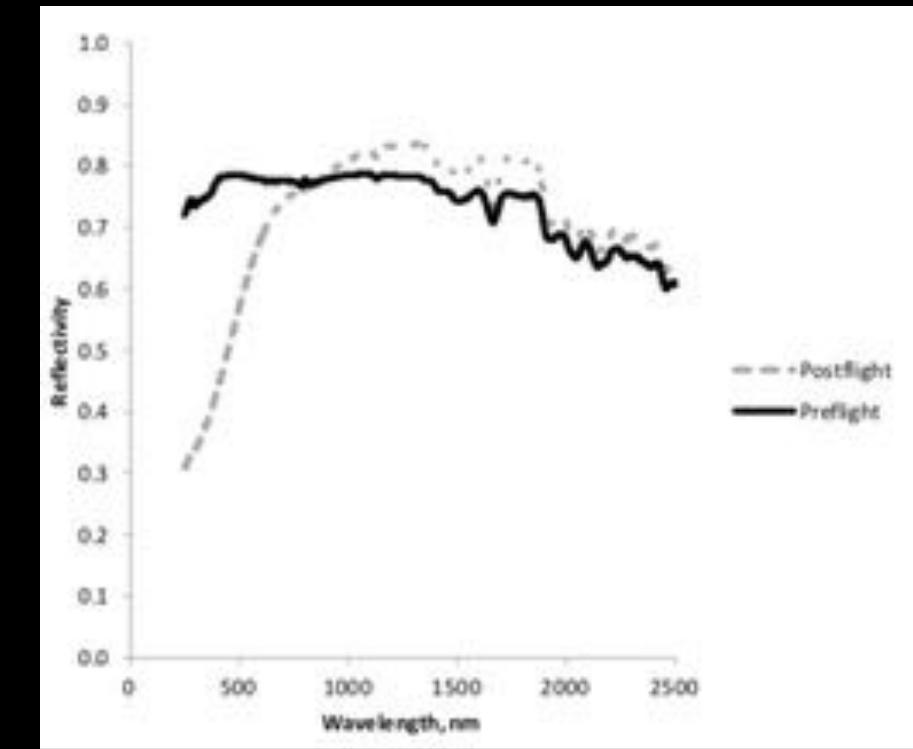
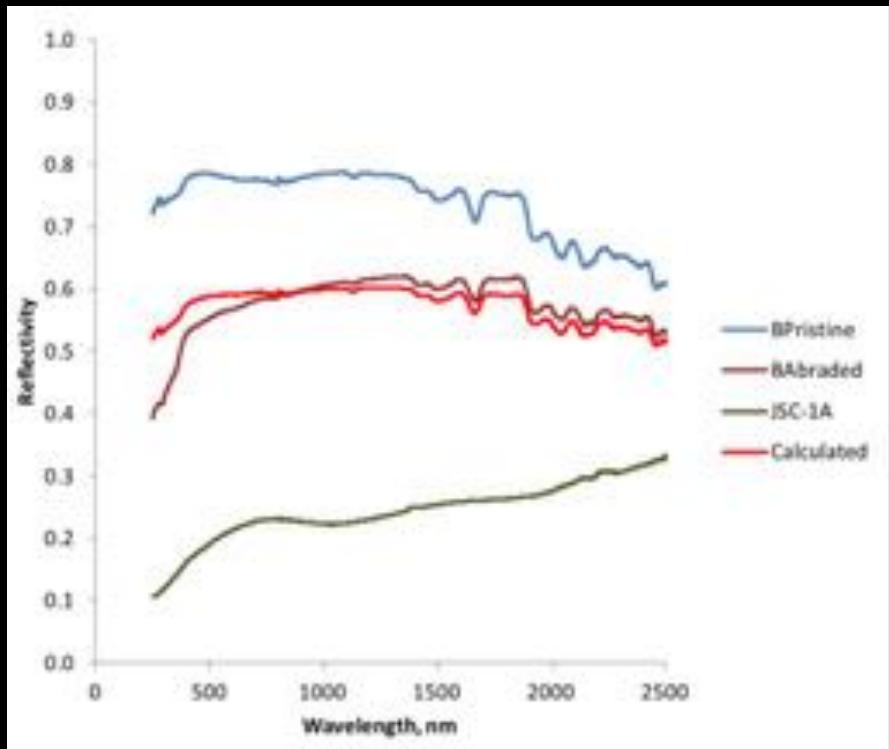
DA-Scenster 1.0kV 14.0mm x2.50k SE(M) 9/23/2011

20.0um

DA-Scenster 1.0kV 14.1mm x2.50k SE(M) 9/23/2011

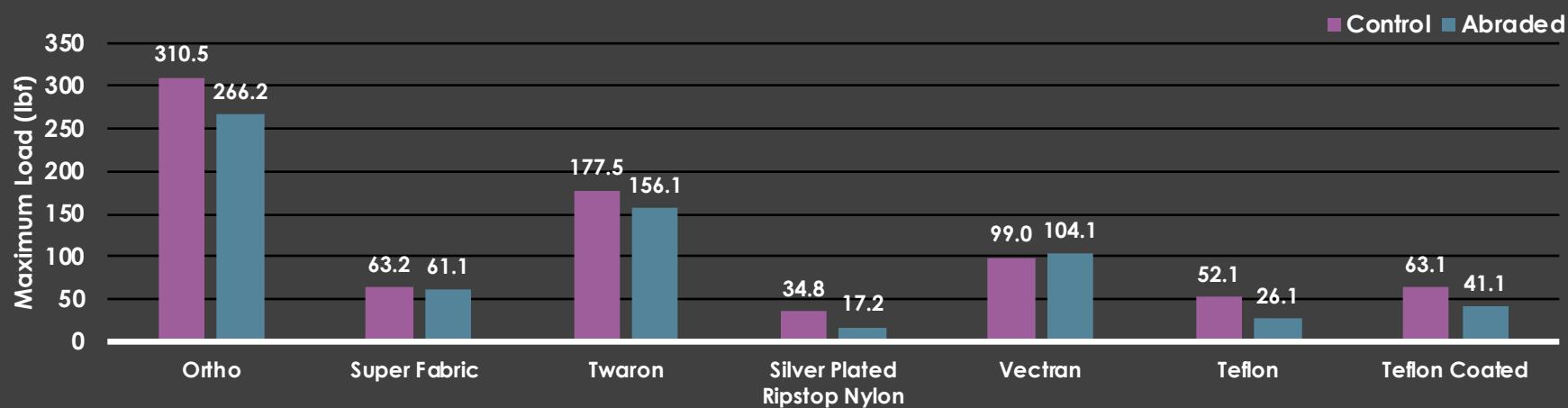
20.0um





Per ASTM D5035

### Break Force





- ▶ Dust EPG features? (Ben)













Credit: Warner Brothers









# JOURNEY TO MARS





Scale: ~1:100,000,000









A  
CHRISTMAS  
STORY



Credit: Warner Brothers

















You are here







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1990  
1990  
1990

