SRIMfit Examples

Update Log :

2018.10/22 ver 3.01.03 English edition. A few examples are picked up from Japanese version.

SRIMfit Examples

Contents

- Guide for SRIMfit Utilities
- Examples using SRIMfit

(Note)

Some Excel files of SRIMfit include macro description inside. When you open those files, the following message will appear;

I SECURITY WARNING Macros have been disabled. Enable Content

Then, click "Enable Content" and continue.;

Guide for SRIMfit Utilities

Util / srOut2Ws folder

srOut2Ws.xlsm (macro included Excel book)

- **Cnv.Txt** : Read a text file (like Output.txt) of Stopping/Range Table provided by SRIM-2013, and convert it to a Work-Sheet format of MySRIMwb.xlsx.
- **Cnv.Csv** : Read an Excel book file (like SRIMout.xlsx) which contains many Stopping/Range Tables provided by SRIM-2013, and convert all sheets in the book file to the format of MySRIMwb.xlsx.

Util / forCprog folder

mk R(E) LET(E) array.xlsx

mk E R LET array : Make Range(E), LET(E) static array for C-program.

eg)C++prog : Sample functions using the array.

File name: srOut2Ws.xlsm

Sheet name: conv.Txt

This macro included sheet reads a text file (like Output.txt) of Stopping/Range Table provided by SRIM-2013, and convert it to a Work-Sheet format of MySRIMwb.xlsx.

										SRIM	2013Outpu	t_sample
1	А	В	С	D	E	F	G	"srOut2Wsl	E.xlsm"	SRIM	out_sample	2
-		SRIM	it srOu	+2\\	le					📳 srOut2	2Ws.xlsm	
Z		Ortherin		1211	3	"		" -				
3					cor	ivert ″SR	IMoutput	.txt″ (Text	t format)	to SRIMw	s format	
4		01										
5		Sta	art Ixt	1	Pre	paration						
6		con	version		Mak	e a .Stopp	ing / Ran	ge Table fil	e (named l	ike a ″SRII	Moutput.tx	t″)
7	- (1		· · · · · ·	·	usir	ng SRIM-20	013 code.					
8	U) Push tr	is buttor	<mark>ר</mark> 2	Pus	sh "Start	Txt conv	/ersion″bi	utton.			
9					Spe	cify the fi	e path fo	r the ″SRIN	loutput.txt			
10					The	n a new sl	neet will b	e generate	d in this bo	ook.		
11					Plea	ase wait u	ntil the co	nversion wi	ill be finish	ied.		
12				3	Aft	er conver	sion					
		VerLo	g _wsF	orm_		conv. Txt	conv.	Csv +				•

Some sample files for the "SRIMoutput.txt" $% \mathcal{A} = \mathcal{A} = \mathcal{A} = \mathcal{A} = \mathcal{A} = \mathcal{A}$

are included in this folder.	2 Select a Text file
SRIM2013Output sample	gus costore
	💮 🥳 Hydrogen in Air, Dry (ICRU-104) (gas).txt
_SRIMout_sample	🥳 Hydrogen in Gold.txt
srOut2WsE.xlsm	😻 Uranium in C- O- N-Ar (gas).txt

After the conversion finished, a new sheet will be appeared.

1	A 1	B	С	D	E	F	G	H	I J	K L	M	N 0	P 16	Q R	Microsoft Excel "srOut2WsE.xlsm	,"
2	2	"SRIMF	it″dat	a table	e			Ŭ	0 10	please fill i	in fill	from SRIM ou	utput	please ch		
3	3	SBIM ver=	SBIM-201	100	Gas	2 Gas	== Target	Compositio	on ==	nlease change i	n change	for appropria	te value/for	mula		
4	4	Ion Z=	1			Atom	Atom	Atomic N	Aass	Multiply Stoppi	ing by ; for S	topping Units			Conversion completed	
5	5	Ion A=	1	amu		Name	Numb	[%] [8	6] unitID	Onv. Factor		ThisWSname	Hydrogen in	Air, Dry (IC	Conversion completed.	
6	6	Target=		short name		C	6	0.02	0.02 1	1.200E-02 eV	/ Angstrom	Corded			Please change the WS name.	
7	7		ir, Dry (ICI	Q-104) (gas)	0	8	3 21.08 2	23.18 2	1.200E-01 ke\	//micron					
8	8	Trg.Dens=	1.2000E-03	¢∕cm3		N	1 7	78.43 7	7 <mark>5.51</mark> 3	1.200E-01 Me	V/mm					
9	9		4.9672E+19	atoms/cm	3	Ar	· 18	3 0.47	1.29 4	1.000E+00 ke\	/ / (ug/cm2)					
10	10	BraggCrct=	0.00%			_			5	1.000E+00 Me	V / (mg/cm2	2)				
10	11	- · ·	row#	SRIM E	range	-			6	1.000E+03 keV	//(mg/cm2				OK OK	
12	12	Emin=	20	0.01	10eV/A	-			/	2.416E+01 eV	/ (1E15 ator	ms/cm2)				
1.4	14	Emax=	228	- 1000000	IGeV/A			100.0 1	100.0	1.332E+01	.S. reduced	unit				
14	141	f Gas; Ptbl =		Pa				100.0 1	100.0	== 5 : MeV/(m	ng/cm2)					
10	101	f Gas; Itbl =		0860			De 11/1 - 1	0)]								
17	16			SRI	Stopping	Power Unit =	[MeV/(mg/	cm2/]		1. N. 15. 1		1				
10	10	Ion		DANGE.	at/ax tie		all action	Projected	E1	Longitudinal	E.m.1	Lateral	E1	- H F	h	4
10	10	chergy		[iviev/u]	U	vie v7 (mg/ ch	2/]	nange	Linu	Straggling	Lumi	Straggling	Linu	0.000	10 Hydrogen in Air Dry (ICPIL 1 1 10 100 10)00
20	20	0 00000	٥V	0.000010	11765-0	2 1 2515-02	2.427E-03	7090 A	0.79900	1.44	1.440	1.04 um	1.040		nyurogen m xm, bry (icko	4
21	21	10,9999	ev eV	0.000011	1.234E-0	2 1293E-02	2.527E-02	8474 A	0.84740	1.52 um	1.520	11 um	1 100			-
22	22	11,9999	eV	0.000012	1.288E-0	2 1331E-02	2.619E-02	8956 A	0.89560	1.6 um	1.600	1.15 um	1 150			
23	23	12,9999	eV	0.000013	1.341E-0	2 1.367E-02	2.708E-02	9429 A	0.94290	1.67 um	1.670	1.21 um	1.210	-	<u>ି</u> ଜ୍ଞ	-
24	24	13,9999 -	eV	0.000014	1.392E-0	2 1.400E-02	2.792E-02	9894 A	0.98940	1.74 um	1.740	1.26 um	1 2 6 0			
25	25	14.9999 (eV	0.000015	1.440E-0	2 1.431E-02	2.871E-02	1.04 u	m 1.040	1.81 um	1.810	1.31 um	1.310			
26	26	15.9999 4	eV	0.000016	1.488E-0	2 1.460E-02	2.948E-02	1.08 u	m 1.080	1.87 um	1.870	1.36 um	1.360			
27	27	16.9999 (eV	0.000017	1.534E-0	2 1.488E-02	3.022E-02	2 1.12 u	m 1.120	1.94 um	1.940	1.41 um	1.410		Ž	
28	28	17.9999 (eV	0.000018	1.578E-0	2 1.513E-02	3.091E-02	2 1.17 u	m 1.170	2 um	2.000	1.45 um	1.450	E		d
29	29	19.9999 4	eV	0.000020	1.663E-0	2 1.561E-02	3.224E-02	2 1.25 u	m 1.250	2.13 um	2.130	1.55 um	1.550			
30	30	22.4999 (eV	0.000022	2 1.764E-0	2 1.613E-02	3.377E-02	2 1.36 u	m 1.360	2.28 um	2.280	1.66 um	1.660		-dE/doElec	
31	-31	24.9999 (eV	0.000025	1.860E-0	2 1.660E-02	3.520E-02	1.46 u	m 1.460	2.43 um	2.430	1.76 um	1.760		dE/dxNucl	
32	32	27.4999 (eV	0.000027	1.950E-0	2 1.702E-02	3.652E-02	2 1.56 u	m 1.560	2.57 um	2.570	1.87 um	1.870			
33	33	29,9999 4	eV	0.000030	2.037E-0	2 1.739E-02	3.776E-02	1.66 u	m 1.660	2.7 um	2.700	1.97 um	1,970			
34	34	32,4999 4	eV	0.000032	2.120E-0	2 1.773E-02	3.893E-02	1./6 u	m 1./60	2.84 um	2.840	2.07 um	2.070	_		
30	35	34,9999 4	ev	0.000035	2200E-0	2 1.804E-02	4.004E-02	1.86 ui	m 1.860	2.97 um	2.970	2.16 um	2.160			
30	36	37.4999 4	ev -V	0.000037	2/28E-0	2 1.833E-02 0 1.950E-00	4.111E-02	1.95 ui	m 1.950	3.09 um	3,090	2.25 um	2,250		E beam [MeV/A]	
30	37	44,0000	ev oV	0.000040	2.002E=0	2 1.009E=02 2 1.005E=02	4.4005-02	2.00 u	2.000	2.46 um	3.220	2.50 um	2.330		<u>0.01</u>	J
00	00	44,99999	8V	0.000040	2.4000		ACTES OF	0.40	2.240	3.40 um	0.400	2.02 um	2.020			
4	Þ	conv	v. Txt	conv.	. Csv	Hydroge	en in Air	, Dry (I	CRU-	(+)						•

% for detail, please see "UsersManual : Prepare MySRIMwb".

File name:	srOut2Ws.xlsm	(cont.))
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Sheet name: conv.Csv

This macro included sheet reads an Excel book file (like SRIMout.xlsx) which contains many Stopping/Range Tables provided by SRIM-2013, and convert all sheets in the book file to the format of MySRIMwb.xlsx.

		1	а в			<i>16</i>	SRIMo	ut 040	Ar.xls	;x"₌
Some sample files for the "SRI	Mout.xslx"	2	SRIM Calc.	version date	>	SRIM-20 July	13.00	2015		
are included in this folder.		4								
SPIN2012Qutruit comple		5 6	Disk	File	Name	=	SRIM	Outputs¥,	4in	Silic
_SKIVI2013Output_sample		7								
SRIMout sample	SRIMout 040Ar.xlsx	8	lon	=	Argon	[18]	,	Mass	=	
		10	Target	Density	=	2.32E+00	g/cm3	=	4 98E+22	2 ator
📲 srOut2WsE.xlsm		11	======	Target	Composit	j =====	3, 01110		1.000 20	
		12	Atom	Atom	Atomic	Mass				
		13	Name	Numb	Percent	Percent				
		14								
Other samples can be download	ed trom	15	Si	1	4 100	100	I.			
SDIMfit Hama Daga		16								
SRIMITE HOME Fage.		17	Bragg	Correcti	or=	-6.57%	1	((0)		
		18	Stopping	Units		MeV	/ 6	(mg/cm2,	Channeline	
		19	266	Dottom	OT	Iable	tor	other	Stopping	unit
		20	Ion	dE/dx	dE/dx	Projected	Longitudir	Lateral		
		22	Energy	Elec.	Nuclear	Range	Straggling	Straggling		
		23								
		24	399.999	9 eV	8.88E-02	9.20E-01	21	A	12	2 A
		25	449.999	9 eV	9.42E-02	9.68E-01	22	A	13	3 A
		06	400.000	Ar-40 in !	Silicon	Ar-40 in	Aluminu	m Aro	1/ Ton in G	old

	А	В	С	D	E	F	G	Н	Ι	J	K 4	srOut2Ws	E.xlsm"-
1		ODIAC											
2		SRIMT	it srUu	tZW	S								
3					con	vert "SR	IMout.xlsx	″ (CSV fe	ormat) to	SRIMws f	format		
4		Sta	art Csv										
5				1	Pre	paration							
6		con	version		Mak	e a .Stopp	ing / Rang	e Table fil	es (named	like a "SR	IMoutput.	txt")	
7		Duch thi	c butto	<u> </u>	usin	g SRIM-20	013 code. A	And read t	hem into a	book file ((named lik	e a "SRIMo	ut.xlsx″)
8		ush un	S DULLOI	2	Pus	h "Start	Csv conv	ersion″b	utton.				
9					Spe	cify the fil	e path for	the "SRIM	lout.xlsx″.				
10					The	n new she	ets will be	generated	in this bo	ok.			
11					Plea	ase wait ur	ntil the cor	version fo	r all sheet:	s in the "S	RIMout.xl	sx″ will be ·	finished.
12				3	Afte	er conver	sion						
		VerLo	g _wsF	orm_	C	onv. Txt	conv. C	sv 🕂				÷ •	

2 Select a book file (like SRIMout_040Ar.xlsx)

All sheets included in the "SRIMout *.xlsx" will be converted. As it takes time, please wait for a while.

X for detail, please see "UsersManual : Prepare MySRIMwb".

File name:	mk R(E) LET(E) array.xlsx
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This sheet makes Range(E), LET(E) static array for C-program.

Save this sheet as a text file, and include it into your C-program.

													sample_c	рр				
													mk R(E) L	ET(E) array(sa	amp	le out).p	rn
													mk R(E) L	ET(E) array.xl	sx		
													. ,					
	A	В	С	D	E F	G	H	Ι	J	K L	_	M N	0	Ρ	Q	R	S	T
1		-	DU IC.		•						_ \	/ _	\ \					
2		S	RIMTIT	to	orCprog					make Rl	E)	LEILE) array					
3		مله	This shos	+				uning SP	IN A G	t functions								
5		*1*	Fu[]	2C 11	lakes triree	anays be	10.00	Beam Ene	ergy	/Index Us	sing t	his index	kamav ne	ext t	two arrav	/s ar	e genera	ated
6			E2R_Bear	nNa	ame_TargNa	me[]		Beam E -	->	Range con	versi	on table			,		0	
7			E2L_Bean	nNa	ame_TargNa	ime[]		Beam E -	\rightarrow	LET conve	rsior	n table						
8		*	Energy st	ep	in Eu[] can	be modif	ied ·	for your o	wn	purpose.								
9		444	detault is	ma	de tor RIKE	N AVE+R	RO 	Emax = 1:	39V	/leV/A expa	erime	ent.						
11		नर sk	Please cr Source thic	nan, Ioch	ge Decima oot op TEV	T(* precisioi	n a Form	s you like at)										
12		-14	save mis save as *	esn tos	visnotgoo	d, becaus	e th	iese table	s ha	ave comma	as í í a	alreadv				+		
13						.,					, ,					$\uparrow \uparrow$		
14																		
15	static do	uble	∍ Eu[] = { ,	/*	[MeV/u] Eb	m index t	able	(commor	n foi	r all beams)*/		← F = F	- Euf	ix] is	an	index	arra
16	150.0	,	149.0	,	148.0 ,	147.0		146.0	,	145.0 ,		144.0 ,	. <u> </u>	rot	ing foll		ing or	covo
1/	140.0	,	139.0	,	138.0 ,	137.0	,	136.0	,	135.0 ,	_	134.0	100.0	ra		OW	101 0	ays.
10	120.0	,	129.0	,	128.0 ,	117.0	,	116.0	,	115.0		124.0	113.0	,	112.0		121.0	',
13	120.0				,			110.0		110.0 ,			110.0					
66	0.0010	,	0.0009	,	0.0008 ,	0.0007	ľ,	0.0006	,	0.0005,	(0.0004	0.0003	3,	0.0002	2,	0.000	1
67	};																	
68							_											
69	/*	Be	am =		84Kr				*/		÷	Speci	fy Bear	n, ˈ	Target,	, LE	ETunit	_
70	/* /*	la	rget = Toucit =		51	MANIK			*/		- E	2R_Be	am_Tar	g	[] ←	srE	2Rang	()-
71 72	/ 96 / 44	LE MA	l unit –		orim94Kr (Mev/(n s:	ng/ (cm∠)	**/ -4⊬/		Ē	21 Be	am Tar	σ [·1 ← 9	srF	21 FT+	\cap $+$
72	/* /*	Rn	oname− otbl =		F2R 84Kr S	3E1			*/			00	uni_rui	51				
74	/*	LE	Ttbl =		E2L 84Kr S	SiF 1			*/		_ ar	e gene	erated.					
75																		
76	static do	uble	Э		E2R_84Kr_S	SiE 1		= { /* [ur	n] •	¢/								
77	5802.0	,	5737.3	,	5672.6 ,	5608.0),	5543.3		5478.6,	Ę	5413.9 ,	5349.2	2,	5288.3	2,	5227.	7,
78	5167.2	,	5106.7	,	5046.2	4985.8	3,	4925.3	,	4864.8	4	4804.3	4743.8	3,	4683.4	4,	4622.	9,
127	0.05428		0.04987		0.04539	0.04085	5.	0.03632		0.03162	0.	02686	0.02192	2.	0.01666	3.	0.0107	8
128	};						Ĺ									Í		
129																		
130	static do	uble	Э		E2L_84Kr_S	5i[]		={/*[N	leV	/(mg/cm2))]*/	′						
131	5.6228	,	5.6481	,	5.6733 ,	5.6985),	5.7237	,	5.7489 ,	5	5.7741 ,	5.7993	3,	5.8281	і, а	5.857	4,
132	0.8867 61051	,	5.9161 6.2100	,	0.9404 ,	6.974	· .	6.0040	,	6.0334 ,	1	0.0027, 3.0004	6.4201),	0.1214	+ , >	6.150	/, 5
133	0.1801	,	0.2198	,	0.2040,	0.2893	,	0.3240	,	0.3087,	1	1.3934 ,	0.4281	,	0.4028	э,	0.497	U,
1.81	7 0602		6 9943		6.9148	6.810	1	6 6779		6 5013	P	3 2663	5 9316	3	5415	7	4 476	9
182	1.0002	,	0.0040	,	0.01-10,	0.010	,	0.0770	,	0.0010,		, 2000 ,	0.0010	, ,	0.410	r y	1. 470	-
100			/				5		<u> </u>	1								
			verLog		INK E R	LET arr	ay	eg)	C+	-+prog		(+)						

File name: mk R(E) LET(E) array.xlsx

Sheet name: mk E R LET array

This sheet shows a sample C-program to read the generated Eu(ix), R(ix) and LET(ix) arrays. Some simple functions like E2RNG(E), E2LET(E), RNG2E(R), Enew(E), Eold(E) are presented.

> Some sample files for C++ are included here. May be it runs on usual C, also.

sample_cpp
 mk R(E) LET(E) array(sample out).prn
 mk R(E) LET(E) array.xlsx

1	A	В	С	D	E	F	G		Н
2		SRIMfit f	orCprog		C++ function exar	nple)		
3									
4		*Below is a sa	ample program using	g E2R E2L array gei	nerated by previous sheet.				
5		e.g.) LET, Ran	ge, Enew, Eold calc	ulation functions					
6									
7									
8		// File:	CRIPSsub LET on	1					
9		// Descript	F2LFT_F2Rng tab	e					
10		// Undate:	201410/14 Av Kr	∽exn anal					
11		//							
12									
13		static double F	- Fu∏ = { /* [MeV/u]	Ehm index table (com	mon for all beams) */		common	EUE 1	tahle
14		1500 1490		460 1450 1440 1	430 1420 1410		oonnon		condic
15		1400 1390), 1980, 1970, 19	70.0, 195.0, 194.0, 1 36.0, 195.0, 194.0, 1	33.0 132.0 131.0				
10		140.0. 130.0	. 100.0. 107.0. 1			-			
64		0.0010, 0.0009	, 0.0008, 0.0007, 0.0	006, 0.0005, 0.0004, 0.	0003, 0.0002, 0.0001				
65		};							
66									
67		static	int	iEuMax = sizeof(Eu)/si:	zeof(double);				
68		static	int	jDBG = 0;	// for DBG message				
69									
70				///////////////////////////////////////	///////////////////////////////////////				
71			// include E2Range,	E2LET tables					
72			///////////////////////////////////////						
73		//		E2R, E2L data table	bmID beam				7
/4		#include	CRIPSdat_12C.cpp	// 1	120	inclu	ude E2RLJ	E2LL	j tables
75		#include	CRIPSdat_4UAr.cpp	// 2	4UAr				
70		#include	ORIPSdat_84Kr.cpp	// 3	84Kr				
70		#include	ORIPSdat_86Kr.cpp	// 4	80Kr				
70		#include	ORIPSdat_130Xe.cpp ORIPSdat_107Au.org	// D // 6	1074				
19		#Include	CRIPSual_197Au.opp	// 0	T97Au				
81		// Work area y	ariables are defined	no quitable for Opl inc r	pahaia				
82		// (One Beam	an ables are den nieu - a) x (Pon no IFT tok	as suitable for Officine a Noe of) v (Somo Motoris	anaiyaia. ale uead)				
83		// (One_Dean	double	hmA:	// Ream Mass Number	table	minters		
84				y	// Range, LET table minter		- por nor o		
85			double	*E2Rsi, *E2Lsi:	// Material = Si				
86			double	*E2Ral, *E2Lal:	// Material = Al				
87									
185		//======							
186			Enew	E> Th> Enew	1				
187		//=======							
188		double	Enew(double* F2	R double F1 double T	h) // [MeV/u]		Enew(E.1	[hick]	function
189		11	F2RD	n, double in, double i	$(F \rightarrow Range table min)$	ter	L110 W\ L,	more	- anotion
190			F1	[MeV/u]	heam Energy				
191			Th		material Thick of F2DD	_			
102		1		Lauli					
	•	Ve	rLog mk E	R LET array	eg) C++prog	(+		

Examples using SRIMfit

example Install_check folder

sr_eg_AddIn.xlsm = ex	xact	tly same as "3_Install_check.xlsm" in the "_Install" folder
eg11Macro Info	:	tutorial of srMcr*() functions
eg12MySRwb chec	ck∶	<code>tutorial of srInfo*(</code>) and other fundamental functions
eg21	:	tutorial of srEnew(), srEnewGas() and srE2LET() functions $% \left({{\left({{\left({{\left({{\left({{\left({{\left({{\left($
eg22	:	tutorial of srEold() and other functions

example for RIKEN_Exp folder

Sample sheets used for heavy ion irradiation exp. at E5A beam line in RIKEN.

E5A06_IC_RangeAna.xlsx

Determine beam energy for irradiation setup in air pressure environment

E5A07_EspcComp.xlsx

Solve a material thickness comparing two beam-energy spectra (Espc) of w/o (Espc1) and w/ (Espc2) the material.

File name: sr_eg_AddIn.xlsm

Sheet name: eg11Macro Info

This sheet is a tutorial of srMcr*() functions.

These functions return the status of running "SRIMfit.xlam" in Excel system.

	A	В	С	D	E	F	G	Н	Ι	J	K	L	M "sr	_eg_AddIn	.xlsm"
1															
2		SR	RIM	fit_chee	ck		AddIn ma	cro	version: fi	nction call	is = srFu	incName() v	v/o file path	n	
3															
4		usa	ge f	or Macro	–Info fi	unctions			Green a	re returned	d value	Change of	current My	SRI <mark>Mwb</mark> to	o others
5															
6			srM	crVer()			SRIMfit v	ersi	on number	-		d	hange MySF	awMB	
7				SRIMfit v.	3.12						``````````````````````````````````````				
8			srM	crPath()			SRIMfit in	sta	lled direct	ory path					
9				C:¥Progra	ım Files (>	(86)¥Micro	soft Office	¥rc	ot¥0ffiœ1	6¥Library		Change b	back to def	ault MySI	RIMwb
10			srM	crWBnam	e()		Current N	lyS.	RIMwb file	name		installed	in System	AddIn fol	der
11				MySRIMw	b.xlsx										
12			srM	crWBdir()			Current N	lyS.	RIMwb dire	ectory path	7	d	etault MySF	RIMwb	
13				C:¥Progra	ım Files (>	(86)¥Micro	soft Office	¥rc	ot¥0ffiœ1	6¥Library¥	¥ \				
14			srM	crWScour	nt()		Number o	f sł	neets in My	/SRIMwb		These two bo	ottons call		
15				199								Sub btn1_Clic	ck() , btn2_Click	() defined in th	nis sheet,
16												and excute s	rMySRwb_o	pen()	
17			srM	crWSlist())		WSname	list	in MySRIN	l wb					
18					srInfoWS	corded()	and its c	ora	led info.						
19			List	of insta	lled WS	names									
20		She	et No.	Sheet Name	cf)	Corded info			<i>of) As</i> srMc	rWSlist() retur	ns 1–Dim St	ring array,			
21			1	VerLog					here, = TRA	NSPOSE(srM	lorWSlist()) i	s used for listir	ng in colums		
22			2	srim1H_Si		Ayoshida.RI	KEN 2017.06		After you de	termin the an	ea for listing				
23			3	srim1H_Al		Ayoshida.RI	KEN 2017.06		CTRL+SHIF	T+Enter is nee	eded.				
24			4	srim1H_Au		Ayoshida.RI	KEN 2017.06								
		•		VerLog	eg1	1Macro	Info	eg	12MySR	wb cheo	ck eg	21 eg2	22 (+)	

change MySRIMwb Push this button, then file selection window will appear. You can "temporally change" the default "MySRIMwb.xlsx" in the system AddIn folder to other SRIMwb file.

default MySRIMwb Push this button, then the reference to SRIMwb will change back to the default one.

Note) When you restart your Excel system, the "MySRIMwb.xlsx" in the system AddIn folder is the default file, always.

File name: sr_eg_AddIn.xlsm (cont.)

Sheet name: eg12MySRwb check

This sheet is a tutorial of srInfo*() and other fundamental functions of SRIMfit. These functions return the contents of a sheet included in "MySRIMwb.xlsx"

	А	В	С	D	E	F	G	Н	Ι	J	K	L	М	N	0		Ρ
1		SRIMfi	t checl	k			AddIn mac	ro version:	function o	call is = sr	rFuncNam	∣ ne() w∕o fi	le path				
3																	
5		M _V SRIM _V	vh xlsx. co	ontents (check		Blue are	inputs Gr	een are re	etum valu	es						
6	<u> </u>	ingor and	D.AIDA CO		SHOCK			mpace, are		Joann Varia							
7		WS.name =	srim40Ar_	Air	<- write a	WSname	in the Myst	SRI Mwb .xls>	< (· Char	ige "V	VSnan	ne" the	en you	ı car	ı insp	bect
9		Corrled	Avoshida.RIKE	N 2016.07	Gae?	Gas	== Target (Composition	==	the c	conter	nts of	the sh	eet			
10		SRIM ver	SRIM-2013	.00	000.	Atom	Atom	Atomic	Mass		Multiply S	topping by	; for Stoppir	ng Units			
11		Ion Z	18	Ar		Name	Numb	[%]	[%]	unitID	Cnv. Facto	or					
12		Ion A	40		0	С	6	0.02	0.02	1	1.20E-02	eV / Angs	trom				
13		Target	Air		1	0	8	21.08	23.18	2	1.20E-01	keV / mic	ron		_		
14		T-D	Air (Dry IC)	RU-104lgas «/em?	2	N Aut	10	/8.43	/5.51	3	1.20E-01	MeV / mn	n (
16		i gt.Dens	4987E+19	atoms/cm3		Ar	10	0.47	1.29	4	1.00E+00	MeV / (ug)	/cm2) g/cm2)		_		
17		Bragg.Crct.	0.00%		5		0	0	0	6	1.00E+03	keV / (mg	/cm2)				
18					6		0	0	0	7	2.42E+01	eV / (1E1	5 atoms/cm	2)			
19		Table Range	Min	Max	7		0	0	0	8	9.71E-02	L.S.S. red	uced unit				
20		E [MeV/u]	1.00E-05	1.00E+03			sum	100.0	100.0	0	== 5 : Me	V/(mg/cm	2)		_		
21		Rng µm	3.28E+00	3.66E+08													
22	Lor	ng.Strg[µm] ⊳.Strg[um]	1.39E+00	1.27E+07						12						Lin-Lin	plot
23	La	te.strg[µm]	1.01E+00	1.12E+00							\		srim40Ar	_Air			
25	с	E/dX unitID	0	= 0.1 8						10	····\					EWEL	
26			LETt	LETe	LETn				_		- N					E/dxEre E/dxNur	1
27		dE/d× ma×	25.138	25.080	3.355	in unitID			ିନ୍ଦୁ	0					— d	E/dxTot	
28		at E =	0.688	0.688	0.00043	MeV/u			2	0		N					
29		LET@ 70%	17.60	17.56	2.349	in unitID			_ 🗧								
30		Elow side	0.217	0.219	0.00004	MeV/u				6							
31		Enign side	3.017	3.033	0.00304	iviev∕u											
33		10.0	= Emin [Me	V/u] (for	Lin-Lin p	lot)			- R	4							
34		1.0	= Estep	.,		,			-								
35		E	dEdX Elec	dEdX Nucl	dEdX Tot	Range	Long.Strag	Late.Strag		2							
36		[MeV/u]	[MeV/(mg/	cm2)]		[µm]	[µm]	[µm]									
38		12.56	9.684.E+00	4.675.E-03	9.688.E+00	2.994.E+05	1.070.E+04	1.859.E+03		0							
40		10.00	1.117.E+01	5.724 E-03	1.118E+01	2.174.E+05	6.990.E+03	1.510.E+03		Ŭ	10	20	30	40	50	60	70
41		11.00	1.055.E+01	5.269.E-03	1.056.E+01	2.482.E+05	8.494.E+03	1.638.E+03					E beam [Me	V/A]			
42		12.00	9.988.E+00	4.878.E-03	9.993.E+00	2.807.E+05	9.920.E+03	1.778.E+03									
43		13.00	9.468.E+00	4.540.E-03	9.473.E+00	3.149.E+05	1.130.E+04	1.926.E+03									
44		14.00	8.992.E+00	4.246.E-03	8.996.E+00	3.508.E+05	1.267.E+04	2.080.E+03									
45		15.00	8.556.E+00	3.988.E-03	8.560.E+00	3.884.E+05	1.401.E+04	2.240.E+03	— f	_				100	Log	og nlet	
40		15.00	0.108E+00 7.812E+00	3.708E-03	7.816 E+00	4.204.E+05	1.550.E+04	2.410.E+03	_	ିଲ୍ଲ s	rim40Ar	_Air			LUB-L	5 PIOL	
48		18.00	7.495.E+00	3.397.E-03	7.499.E+00	5.140.E+05	1.867.E+04	2.778.E+03	-	۵ Na				-10	~		
49		19.00	7.206.E+00	3.240 E-03	7.209.E+00	5.597.E+05	2.121.E+04	2.974.E+03		Ś							
50		20.00	6.917.E+00	3.083.E-03	6.920.E+00	6.054.E+05	2.375.E+04	3.170.E+03		ev.				1			
51		21.00	6.691.E+00	2.959.E-03	6.694.E+00	6.554.E+05	2.611.E+04	3.386.E+03	0.00	;⊖).0000	10.0001	0.001 0	.01 0.1		10	100	1000
52		22.00	6.465.E+00	2.836.E-03	6.468.E+00	7.055.E+05	2.846.E+04	3.602.E+03		2 /				A 1			
53		23.00	6.265.E+00	2.724.E-03	6.267.E+00	7.577.E+05	3.077.E+04	3.824.E+03		-							
54		24.00	6.090.E+00	2.623.E-03	6.092.E+00	8.118.E+05	3.304.E+04	4.052.E+03						0.01			
56		20.00	5.783 E+00	2.525.E-03	5 785 E+00	9 236 E+05	3 751 E+04	4.200.E+03						0.01			
57		23.00	5.650.E+00	2.357.E-03	5.653.E+00	9.812.E+05	3.970.E+04	4.768.E+03	_								
58		28.00	5.535.E+00	2.281.E-03	5.538.E+00	1.040.E+06	4.187.E+04	5.018.E+03				•••••• <u>•</u>	-++ 0	.001			
59		29.00	5.438.E+00	2.212.E-03	5.440.E+00	1.100.E+06	4.400.E+04	5.274.E+03									
60		30.00	5.341.E+00	2.142.E-03	5.343.E+00	1.160.E+06	4.613.E+04	5.530.E+03			dE/d	xElec		0001			
61		31.00	5.219.E+00	2.082.E-03	5.221.E+00	1.224.E+06	4.824.E+04	5.798.E+03			dE/d	xnuci vTot			E L	оот ГИ-	N/AT
62		32.00	5.097.E+00	2.022.E-03	5.099.E+00	1.288.E+06	5.035.E+04	6.066.E+03	[0001	LD	zalli Lille	
03		33.00	4.983.E+00	1.906.E-03	4.985.E+00	1.354.E+06	5.247.E+04	0.340.E+03					0.0				
4	Þ	Ver	LOG	egiiMac	ro Info	eg12	MYSRWI	o check	eg21	eg22	+)				(

File name: sr_eg_AddIn.xlsm (cont.)

This sheet is a tutorial of srEnew(), srEnewGas() and srE2LET() functions.

Below is an example to calculate 40Ar beam energy AFTER pathing through the materials of Kapton, Aluminum and Air. Then goes through additional Al_Edegrader foils to control the LET value in a Si semiconductor device at a depth of 200 μ m.

A	B	С	D	E	F	G	Н	Ι	J	К	L	М	N	0	P	Q
2	SR	Mfit	:_cł	neck		AddIn r	nacro v	ersion: t	function	call is	= srFu	ncNa	ame() w/o	file path		
4	srEr	ายพ(). sr	Enew	Gas()	exami	ole									
5	0.2.	This	exam	ple cal	culates l	Energy &	& LET(c	IE/dX)				Г	Blue	are input	ts	
6		fora	bean	n pathin.	g throug	gh four t	arget m	aterials				<u> </u>	Green	are retu	rn values	
7																
8	Header	srim											You	can ch	nange tr	ie values
9	Beam	40Ar			Davia		TANAN	1	Matura				—in Bl	ue cel	ls.	
11	IVIAT	VV.S.r	name NArg	21	Dens 232	197	1 1 2	ru Isilimn	Mat.na	me						
12	A	srim4	0Ar		2.02	185	1.13	Alumin	um							
13	Air	srim ²	(Ar)	Air	1.2E-03	25.1	0.69	Air (Dr	v IORU-	-104(gas	s))					
14	Kapto	srim ²	θAr]	Kapton	1.42	27.3	0.75	Kapton	(Polyim	ide Film	ICRU-	179)			
15																
16	-						E after	pathing t	hrough 1	the mate	rials	-				
1/	Bear	n	7	ın Vacı	um 🔪	Vac. Foi		Edeg to	oils 🔪	Air pati	h 🔪		lair	25.0	degC	
10	A		2	MaX/u	—> MaV	Napto	—> MoV/u	AI	> Ma¥/u	Air	> MaV/u		Pain for and TD	101325	Pa ForThkStd(L
20	40	Ar	18	95 0	3800	75 0	94.39	50 0	93.74	175.0	92 53		correction	0.303	-si mkotu(
21		LE	T(Si)	2.03	[MeV/(m	g/cm2)]	2.04	00.0	2.05	170.0	2.07		Confection			
22		Rang	e(Si)	4668	[µm]		4615		4559		4461					
23	Lo	ng.Str	g(Si)	175	[µm]		174		172		169					
24	Lat	er.Str	g(Si)	27	[µm]		27		26		26					
25		Rang	e(AI)	4126	[µm]		4079		4029		3942					
26		Range	(Air)	8256	[mm]		8163		8064		/889					
27			nton-	100	at Sici	urface	200	um dor	+hin Si							
29			step-	Al-Edes	F1	I FT	= 200 F2	L FT								
30				μm	MeV/u	MeV/(r	ng/cm2)		L	ET.	Εd	@ Sis	urface		
31				0	92.53	2.07	90.08	2.12	1	16	,		<u>e</u>			T 100
32				100	91.14	2.10	88.85	2.14		-			-LET			
33				200	89.75	2.12	87.63	2.16	1	14 🐴		_	-E1	Î		+ 90
34				300	88.36	2.15	86.34	2.18								1 oo ·
35				400	80.90	2.17	80.03	2.21		12	X					<u> </u>
37				600	84.04	2.20	82.43	2.20	n2	2						1 70 ·
38				700	82.59	2.26	81.12	2.29	/c	-		N				
39				800	81.13	2.29	79.76	2.32	b m	10 +						4 60₹
40				900	79.57	2.32	78.40	2.35	_ Š	-				t		- é.
41				1000	78.00	2.36	77.05	2.38	Me	8 +			\			+ 50
42				1100	10.44 רסוקד	2.39	75.69	2.41	_ =	-				1		1 <u>6</u>
43	-			1300	7323	2.43	72.83	2.44	— <u>0</u>	6 +			····· \	4		+ 40 ×
45	-			1400	71.58	2.51	71.37	2.52	- <u>-</u>	-				1		1 30
46				1500	69.94	2.56	69.92	2.56	— <u>m</u>	4			J			
47				1600	68.27	2.60	68.45	2.60		' -			CORPORATE STATE			+ 20
48				1700	66.53	2.66	66.88	2.65				محمحم				
49				1800	64.80	2.71	65.32	2.69		4						 10 ·
50				1 1900	61.22	2.76	62.10	2.14		-				N N		
52				2100	59.32	2.03	60.54	2.79		0 +	1 1		+			+ 0 -
53				2200	57.43	2.97	58.89	2.92		0		20	00	4000	- 60	- 00
54				2300	55.46	3.05	57.25	2.98				A	I-Deg Thi	I <mark>ck</mark> [µm	1	
55		1.3.7		L 2400	53.38	314	55.52	3.05				h		2.2		
	•		erLo	og ∈	eg11M	lacro 1	nto	eg1	2MySI	Kwb c	neck	(eg21 📔 🤅	eg22	(+)	

File name: sr_eg_AddIn.xlsm (cont.)

Sheet name: eg22

This sheet is a tutorial of srEold() and other functions.

Below is an example to calculate the beam energy BEFORE pathing through materials. In order to solve a "Problem" indicated in this sheet,

- (1) the start energy at the given depth is calculated by using srLETt2E()
- 2 goes to upstream direction using srEold() and reaches to the "Answer".
- (3) then goes back to downstream, again, using srEnew() and reaches to the "given condition" of "LET in Si must be 39.0 MeV/u"; a check by re-calculation is done.

	А	В	C	D	E	F	G	Н	I	J	K	L	M	N	0	Ρ	Q	R	S	Т	U	V	W	\rangle	
2 SRIMfit check																									
-2		01	1141		HECK																				
4		orl	Eald) er	Enoul		nlo																		
4	This example is used for a semiconductor inadiation explate E5A beam line in RIKEN																								
6			Tos	s exam solve s	n problem	n below t	sennicoric Seam Fin	athi	na before	mat	exp. at L. toriale an	u All	lulated by	in in ZerF	arken Foldû										
7			thor		al probion al culato	Foffor m	othing th	oud oud	h thom by	undi Kode	Enald are														
/																									
8															Fil	'i in	Blue	celi	ells as your irradiation condition						
9		<u>Problem</u> Solve the beam energy under following conditions. Green c															celi	ls are ret	um	values fro	RIM fit				
10	where the beam extracted into air pressure and pathing through materials listed below, moreover,																								
11		at the depth of 20			[µm] fi	rom	the san	ple	surface,					roon	n tempera	ture	27.7	deg	С						
12		LET in Si must be 39.0				[MeV/(mg/cm2)]				<-Less	41.0	ax LET in sar	nple	air pres	sure	100800	Pa ((1atm=10	1325)					
13													= srMaxLE	Tt()			STPG	coef.	0.969	=sr	ThkStd()				
14		H	leader	srim			Scat.foil		Vac.foil	I	onChambe	er l	Light shiel	d P	Plastic Scin	rti E	-Degrade	r	Air		Sample				
15			Beam	84Kr		WSname	srim84Kr_A	Au	srim84Kr_K	aptor	srim84Kr_N	fylar	srim84Kr_N	fylar	srim84Kr_E	J212	srim84Kr_A		srim84Kr_A	dr	srim84Kr_S				
16						Mat.name	Au		Kapton		Mylar		Mylar		EJ212		AI		Air		Si		- 1		
1/						Thickness	45.8	μm	18.0	μm	24	μm	48	μm	100	μm	800.0	μm	305	mm	20	μm			
18		^		7	Answe	r	calculate E before path			thin,	g through	using sri	Eola			1111/	1124			at the depth					
19		<u>A</u>	12		MeV/u	MeV F0.41	MeV/u		MeV/u	,	MeV/u	,	MeV/u	,	MeV/u		MeV/u	,	MeV/u	,	MeV/u			-	
20		84	- nr	30	07.10	5041	07.10	<-	<u> </u>	<-	09.10	<-	08.09	<-	07.57	ζ-	00.92	<-	19.77	<-	80.0	<-	4.01	1	
21				(2) -	in vacuur	n	<i>re-caici</i>	late	<i>Ε aπer μ</i> 50.10	oatn.	ing through it, using			:r±new()			10.77	_			=srLETt2E		EITZEU		
22				ET(SI)	[MoV/(m		10.46	-	10.65	-	10.72	-	10.96	-	11.02		21.79	-	35.00	/	39.00	6			
24			Ra	nne(Si)	[µm]	ig/ciii2/j	1302		1246		1230		1198		1145		21.70		88		48	9	ע —		
25			LongS	Ara(Si)	[µm]		50	1	48		47		46		44		241		2		1				
26		1	ater	Strø(Si)	[µm]		6				6		6		5		2		1		1				
27			Ra	nge(Al)	[µm]		1156		1107		1092		1062		1012		212		60		42				
28			Rar	nge(Air)	[mm]		2325		2224		2194		2134		2036		421		116		81				
29																_									
VerLog eg11M						acro In	fo	eg1	2M	ySRwb	ch	eck (eg2	21 eg	22	+				- E 🔳					

Examples

File name: E5A06_IC_RangeAna.xlsx

Sheet name: Params

X This sheet needs E5Aexp.xlam

This sheet is used to determine beam energy for irradiation setup in air pressure environment.

	А	В	С	D	E	F	An air–i	onization ch	amber (I	IC2) is	nlaced	l at sample irradiation position	n
1		(name def.)	commor	param	i. in this	book				02/10	placea		
8		WBtitle		2018 K	r Exp		The Bea	am is extract	ted from	i vacuu	im and	i goes through many materials	\$.
7			Edeg	adopted	measured				-				
8			Deg#	μm	μm				Energy	Vac	uum		
9		ThEDtbl	1	10.20	10.10~10	33			Degrade	Win	ndow		
10			2	12.80	12.80			100	FOIIS (EL	JS)	1		
11			3	23.80	23.80			IGZ		IC1			
12			4	48.59	— Tr. [[Darama I	chaot			Г			
13			5	100.24		aramsj	Sheet,		anananananan				
14			6	100.80	thick	ness of	the		*11				
15			7	196.39			. Barad	Eou	t				
16			8	485.95	mate	riais are	e listea.				Be	eam	
1/			9	5000	5000								
18			A	5.48	5.48				(
19			В	975.39	975.39				******				
20			U	2000	2000			i		H '			
20			Beam	adapted	managumad			i	<u></u>				
22			monitorm	adopted	measureu					PI	i i		
20		ThAu	Au	<u>45.8</u>	μ.m 75			Sample					
25		ThKanton	Mu Kanton	78.0	75			position			S	Solve the beam energy	
26		ThiCmdar	IC1 mylar	24.0	24						6	'Eaut' at the axit of EDe ac	
27		ThPI mylar	Pl mylar	48.0	72				▶i			Lout at the exit of LDS as	
28		ThPL	PL E. 1212	100.0	500			′ Lair2		$ \longrightarrow $	c c	corresponding Range value in	
29				mm	mm				Lai	ir1			
30		ThAir1	Air1	145.0	Kap~Edes	Qut		I I			- P		
31		ThAir2	Air2	165.0	EdegOut~	IC2							
32		AirT	a∨rTair	27.7	°C								
33		AirP	a∨rPair	1008.0	hPa								
34						т	o Solvo +	he 'EvoR' .		hange	the vel	lue in this cell	
35			IC2	adopted	measured		0 00100 1	ine Expirt,	Jiease C	nange	une vai		
36		ICs_Mylar	l.Mylar [µm]	4.0	4			Devee					
37		ICs_Th	AirLay. [mm]	2.000	2mm	(00	Kange	adopted				
38						t	00	Anal.	μm				
		para	ms IC	calc	ICana	(. 6	j/ ExpR	ExpR	- <u>888.0 </u>	– Fix it b	y manua		

File name: E5A06_IC_RangeAna.xlsx (cont.) Sheet name: ICcalc

1	A E	3	С	D	Е	F	G	H	Ι	J	Κ	L	М	Ν	0	Ρ	Q	R	S	Т	U	V	3
2	20	18	Kr Exp																				
3	EDegScan ICcalc																						
4																							
5																							
6	WS	heac	srim84Kr	_																			
7	Bea	mΑ	84	Kr																			
8		ret	from) para	ms																			
9								ExpR(#-2)				ExpR(#-1)			ExpR(#+1)			ExpR(#+1)			ExpR(#+2)		
10							⊿ ExpR		-10			-5			0			5			10		
11	M	at	SRIM Fit V	V.S.name			ED		978			983			988			993			998		
12	S	ii 📃	srim84Kr_S	Si		step	ThO	E	rng	⊿ Eclo		Erng	⊿Edc		Erng	⊿ Eclc		Erng	⊿ Eclo		Erng	⊿Edic	
13	A	d	srim84Kr_/	41		μm	μm	Me	eV∕u	MeV		MeV/u	Me∨		MeV/u	MeV		MeV∕u	MeV		MeV/u	MeV	
14	A	ir	srim84Kr_/	Air			— Grap	h star	start —														
15	My	lar	srim84Kr_M	Mylar		50	0.0	54	4.76	3.127		54.93	3.127		55.10	3.127		55.27	3.127		55.43	3.127	
16							50.0	53	3.04	3.127		53.22	3.127		53.41	3.127		53.59	3.127		53.76	3.127	

In the second [ICcalc] sheet,

ightarrow E in IC2 is calculated in advance for the cases of ExpR $\pm 10 \,\mu$ m changing the thickness of EDs. Here, the thickness steps for EDs should be fine near the Bragg Peak, especially.



File name: E5A06_IC_RangeAna.xlsx (cont.) Sheet name: ICana

In the third [[]ICana] sheet, using measured current data points of IC2 according to the thickness of EDs, analysis for ExpR is performed.



Calibration for IC2 between ⊿Ecalc vs measured current. Using this result, the current of IC2 is converted to ⊿Emeas.

 Range
 adopted

 Anal.
 μ m

 ExpR
 988.0

Please open two sheet of $\lceil Params \rfloor$ and $\lceil ICana \rfloor$ together, and try to chane the Exp value.

For this experimental data, ExpR=988 $\,\mu\,{\rm m}$ was the best fit value because ;

- the \angle Ecalc vs current calibration becomes straight,
- the ∠Emeas vs ∠Ecalc plots overlap well especially near the Bragg Peak.

File name: E5A07_EspcComp.xlsx

Sheet name: 2spcComp

This sheet is used to solve a material thickness comparing two beam-energy spectra (Espc) of w/o (Espc1) and w/ (Espc2) the material.

Spectrum conversions listed below are simple. X axis is changed as ADC[ch] \rightarrow E[MeV] \rightarrow Enew(Thick). E -> LET, Range plots are included, also.



- () Specify a Beam as a header name of 'WSname'.
- 2 Fill in ADC data of Espc1 and Espc2.
- ③ Put Energy-Calibration formula as E [MeV] = a * ([ch] b)
- Changing the Thickness of the material, Look Grp5, see an overlap between measured Espc2 and Enew(Thic) calculated Eafter.



