

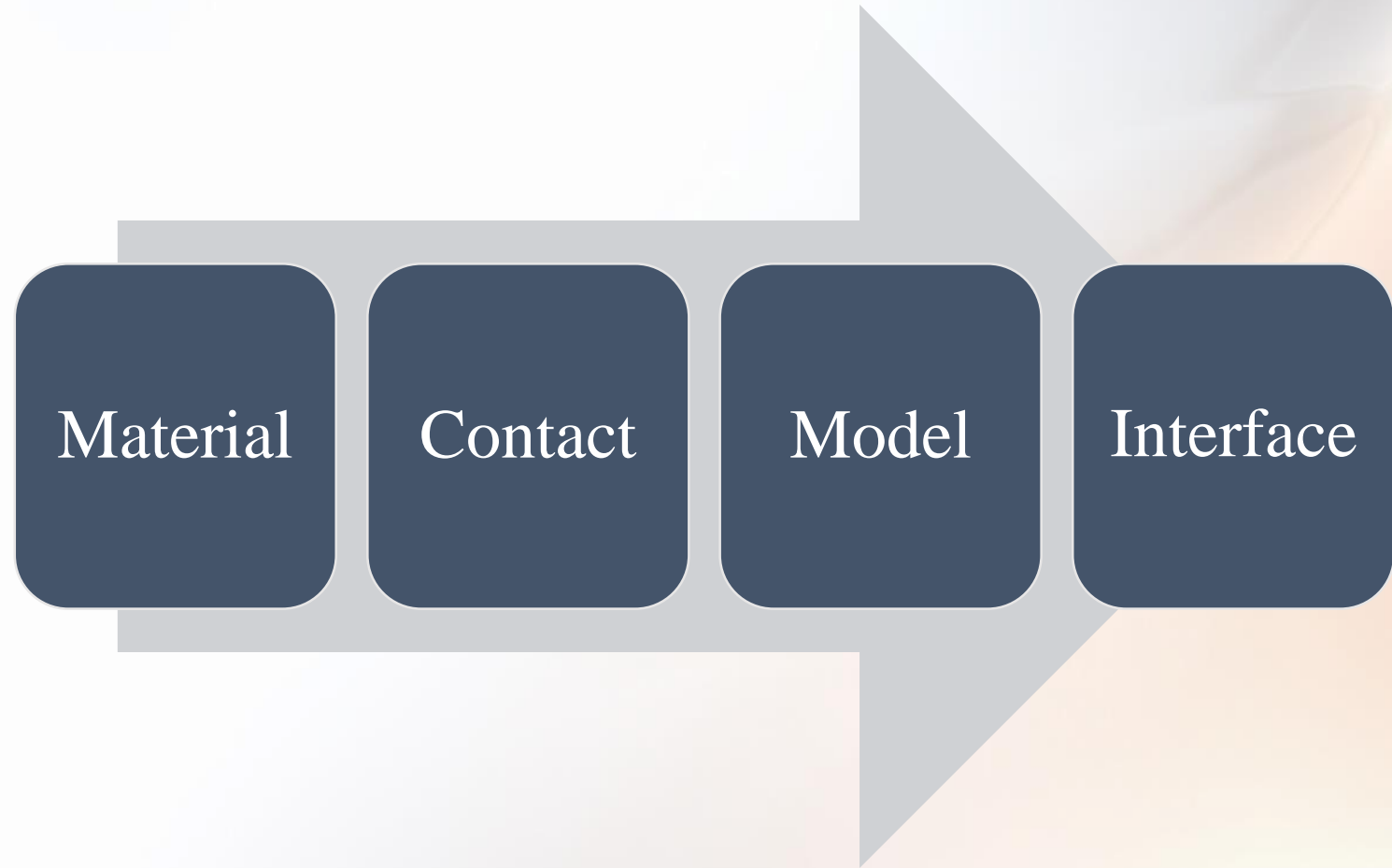
Atlas

Material & Model Specification

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Material & Model specification



Material

- Set material's parameters to arbitrary values.

MATERIAL <localization> <material_definition>

- <localization> can be defined as one of the followings:
 1. material=<name>
 2. region=<number>



Material

- Example:

Material material=si EG300=1.12

MATERIAL TAUN0=5.0E-6 TAUP0=5.0E-6 MUN=3000 MUP=500
REGION=2

MATERIAL TAUP0=2.E-6 TAUN0=2.E-6 REAL.INDEX=3.7 \
IMAG.INDEX=1.0E-2



C-interpreter

- Definition of physical models and material parameters as a function of device parameters (doping, composition, temperature and...) via a standard C-language interface.

Material f.parameter="C file name.lib" <localization>

- The C program file is saved with ".lib" extension.



C-interpreter

Material f.bandcomp="stsiband.lib" region=1

- C program file:

```
#include <stdio.h>
```

```
void bandcomp(double xcomp,double ycomp,double temp,double  
*eg,double *chi)
```

```
{
```

```
*eg = 1.084 - xcomp*(0.31+xcomp*0.53);
```

```
*chi = 4.05+0.58*xcomp;
```

```
}
```



Contact

- Define an electrode characteristics:

```
CONTACT (NUMBER=<n>|NAME=<ename>|ALL) <characteristic  
definition>
```

Example:

```
CONTACT NAME=gate WORKFUNCTION=4.8
```

```
CONTACT NAME=gate N.POLYSILICON
```



Models

- Make atlas assume specific physical models.
- Example:

Models conmob fldmob bgn



Interface

- To define the interface charge density and surface recombination velocity at interfaces between semiconductors and insulators.
- Example:

INTERFACE QF=3e10

specifies that all interfaces between semiconductors and insulators have a fixed charge of $3 \times 10^{10} \text{cm}^{-2}$.



More about Silvaco TCAD

<http://ucourse.ir/open-courses/silvaco/>