

## 1 | **Silicon**

### 1.1 | **refirenry**

#### 1.1.1 | **from sand**

#### 1.1.2 | **melted**

#### 1.1.3 | **small molten crystal "seed" lower into a vat**

#### 1.1.4 | **crystal forms**

#### 1.1.5 | **pull cylander from molten reigon**

#### 1.1.6 | **ground to form ingots**

#### 1.1.7 | **sawed with diamond blade to form wafers**

#### 1.1.8 | **wafer scrubbed**

#### 1.1.9 | **edges rounded and surfaces ground smooth and to create uniform thickness**

#### 1.1.10 | **rinsed and etched in "chemicals" to remove impurities**

#### 1.1.11 | **final polish on one side of the wafer**

#### 1.1.12 | **all so that there are no scratches or contamination**

#### 1.1.13 | **then, measured for resistivity**

1. function of dopant concentratian

### 1.2 | **design**

#### 1.2.1 | **circuit design**

#### 1.2.2 | **organization of design team**

1. based on organization of the chip
2. establish microarchitecture that regulates sequences and timings
3. design divided into areas

### 1.3 | **structure**

#### 1.3.1 | **cubic atomic structure**

#### 1.3.2 | **4 electrons valence shell**

#### 1.3.3 | **perfect crystal will have no holes**

#### 1.3.4 | **but at room temperature, free electrons can conduct**

### 1.4 | **impurities called dopants**

#### 1.4.1 | **negative**

1. arsenic or phosphorus
2. one more valence
3. n type crystal because negative free carriers

#### 1.4.2 | **positive**

1. boron
2. missing electron acts like positive carrier, "hole"

#### 1.4.3 | **silicon can be either good or poor conductor (semiconductor)**

1. controlled by concentration of dopant