Pigments in Chloroplasts

- Chloroplasts contain several different pigments and all absorb light of different wavelengths
- **Chlorophyll a** absorbs blue violet and red light and reflects green
- **Chlorophyll b** absorbs blue and orange light and reflects yellow-green
- The carotenoids absorb mainly blue-green light and reflect yellow and orange

Capture Solar Power

- Pigments in chloroplasts are responsible for absorbing photons (capturing solar power), causing release of electrons
    - The electrons jump to a higher energy level-the excited state-where electrons are unstable
    - The electrons drop back down to their "ground state" and as they do they release their excess energy

Photosystems

- The energy released could be lost as heat or light, but rather it is conserved as it is passed from one molecule to another molecule
    - All of the components to accomplish this are organized in thylakoid membranes in clusters called photosystems
        - Photosystems are light harvesting complexes surrounding a reaction center complex
- The energy is passed from molecule to molecule within the photosystem
    - Finally it reaches the reaction center where a primary electron acceptor accepts those electrons and consequently becomes reduced
    - This solar-powered transfer of an electron from the electron center pigment to the primary electron acceptor is the first step of the light reactions

Type of Photosystems

- Two types of photosystems have been identified and are called photosystem I and photosystem II
    - Each type of photosystem has a characteristic reaction center
        - **Photosystem II**, which functions first, is called P680 because its pigment absorbs light with a wavelength of 680 nm
        - **Photosystem I**, which functions next, is called P700 because it absorbs light with a wavelength of 700nm

Electron Transport Chain in Plants

- During the light reactions, light energy is transformed into the chemical energy of ATP and NADPH
    - To accomplish this, electrons removed from water pass from photosystem II to photosystem I and are accepted by $NADP^+$
    - The bridge between photosystems II and I is an electron transport chain that provides energy for the synthesis of ATP