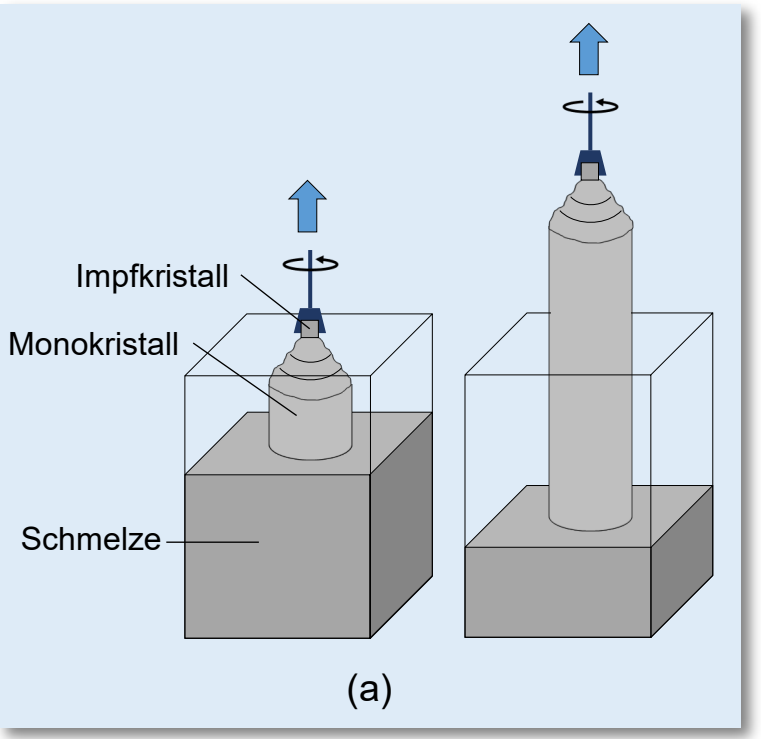
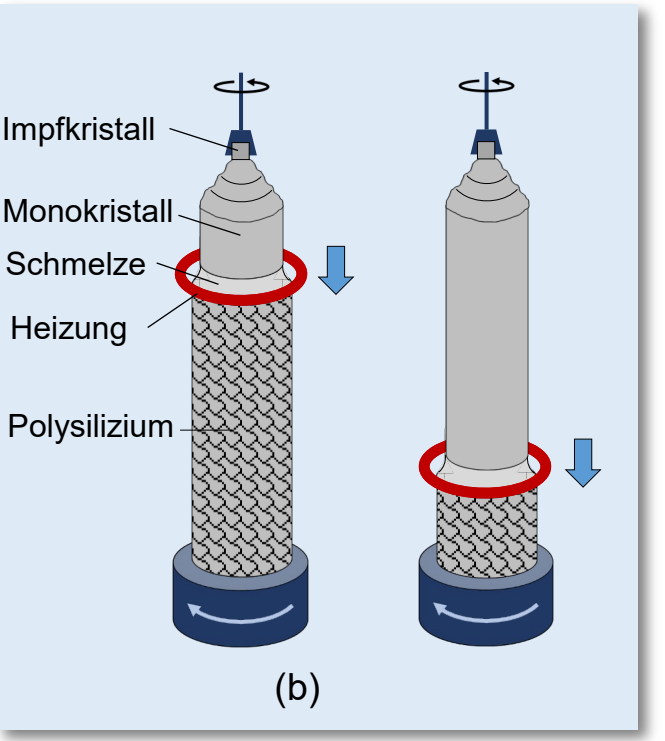
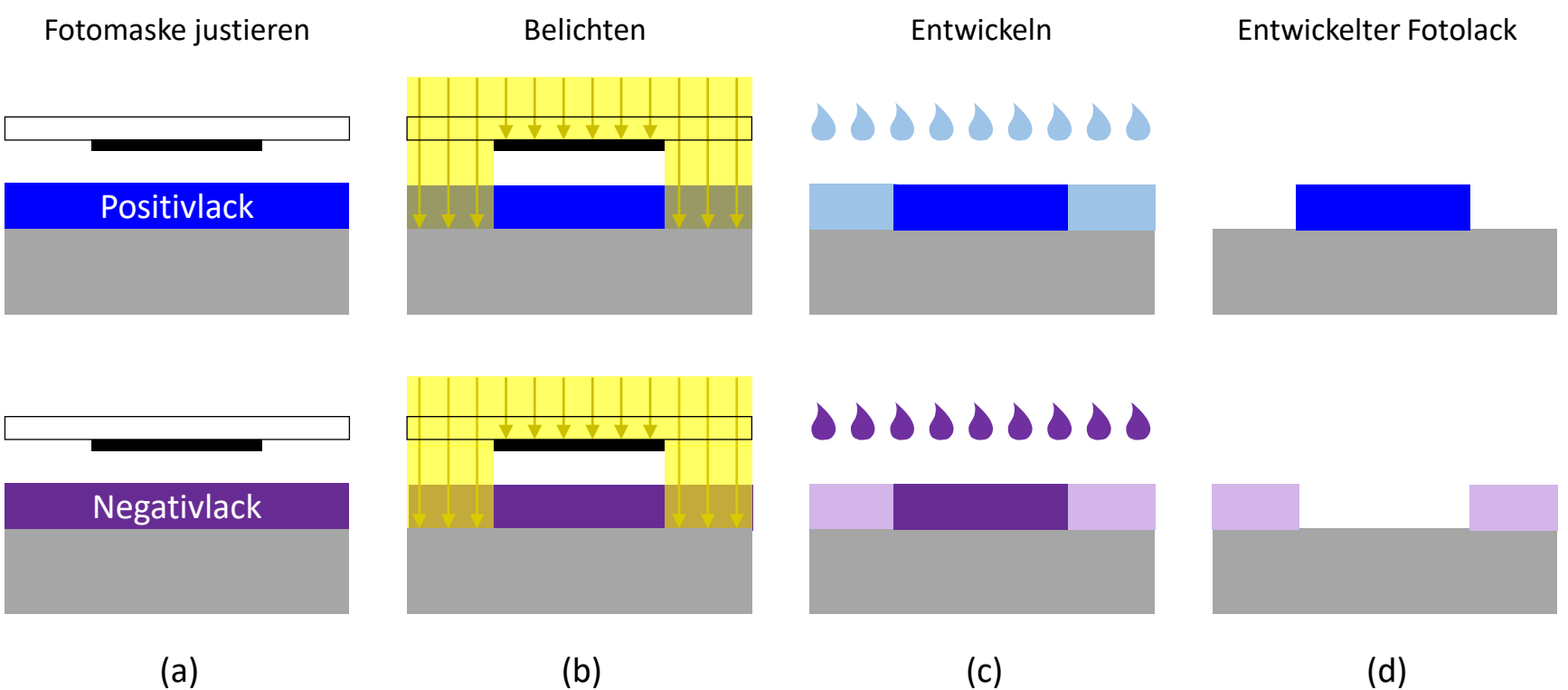
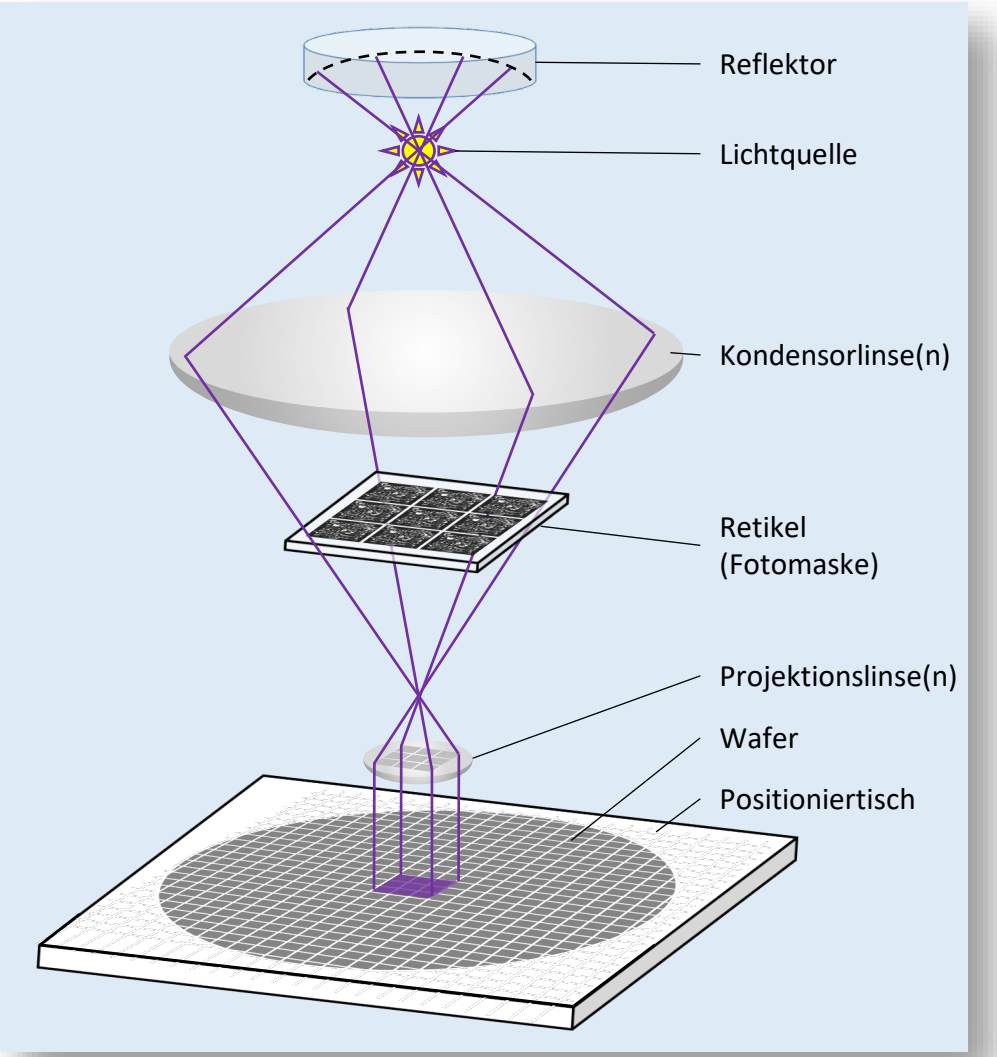
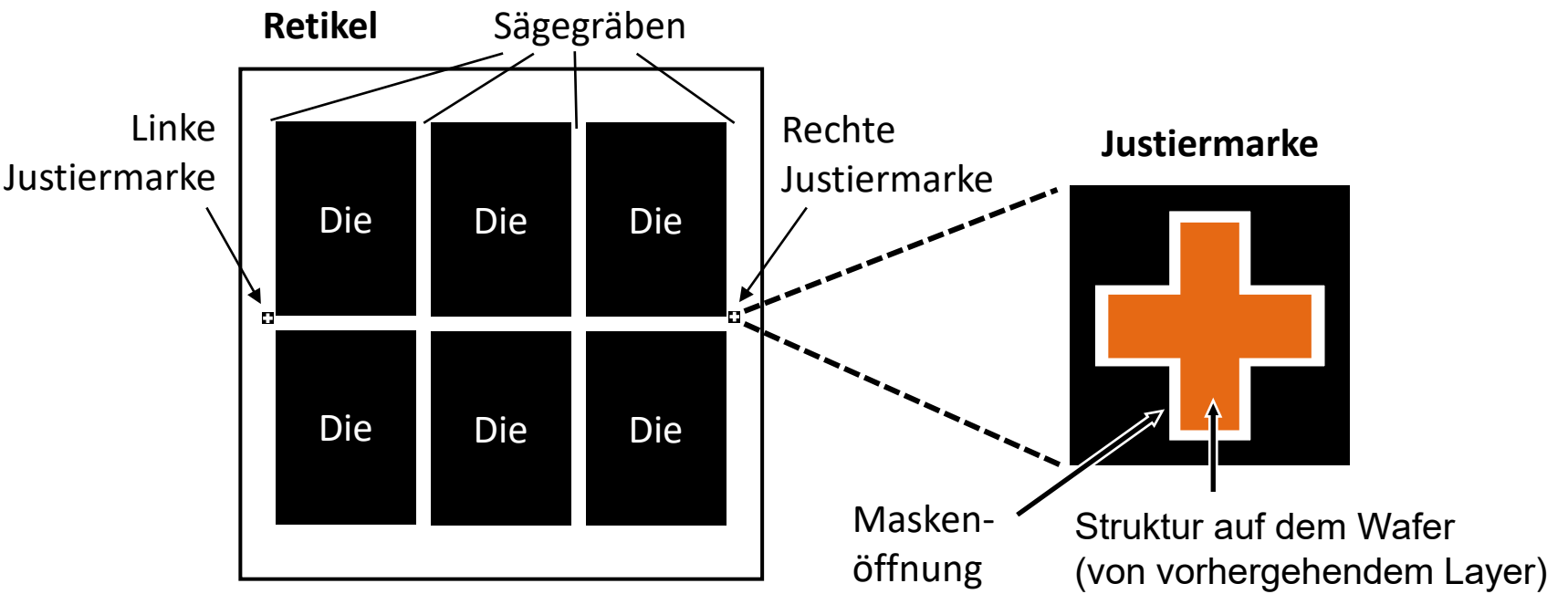
Kapitel 2 - Halbleitertechnologie: Vom Silizium zum integrierten Schaltkreis

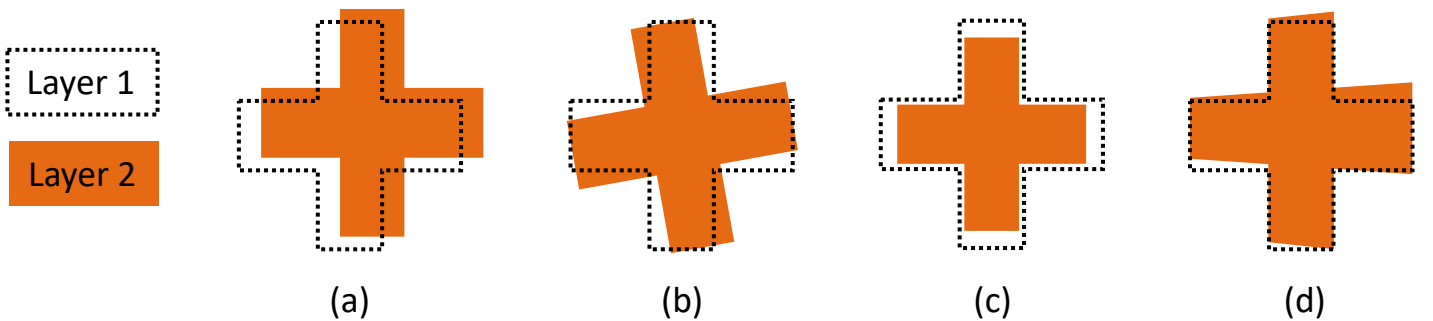


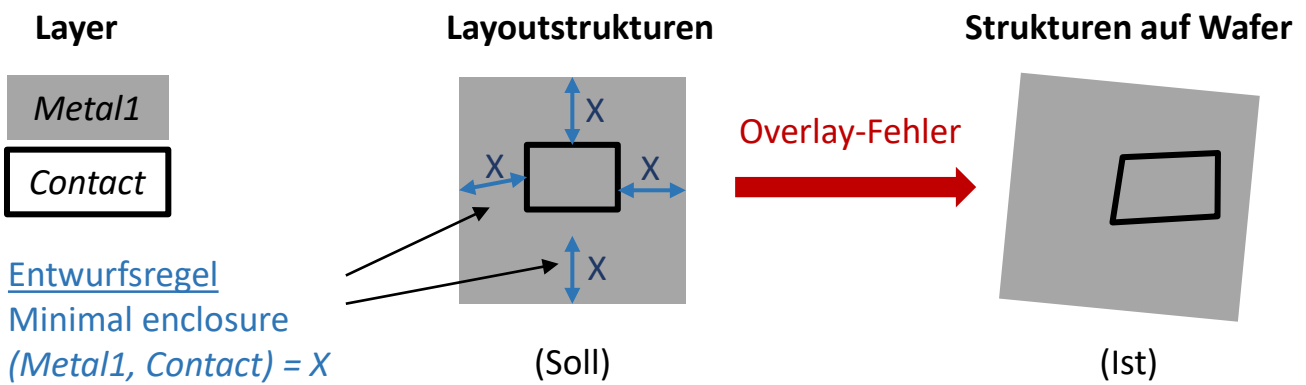


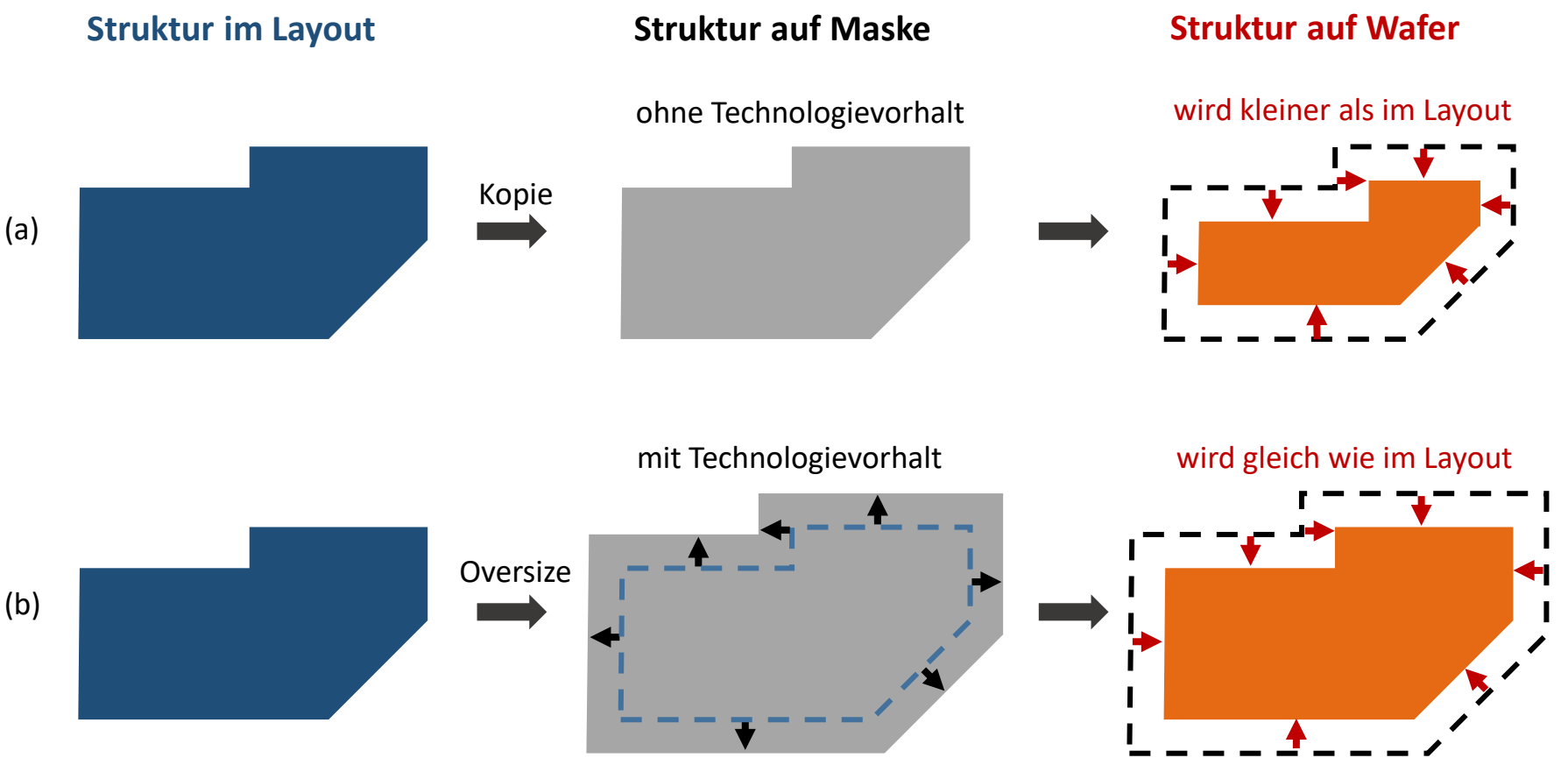


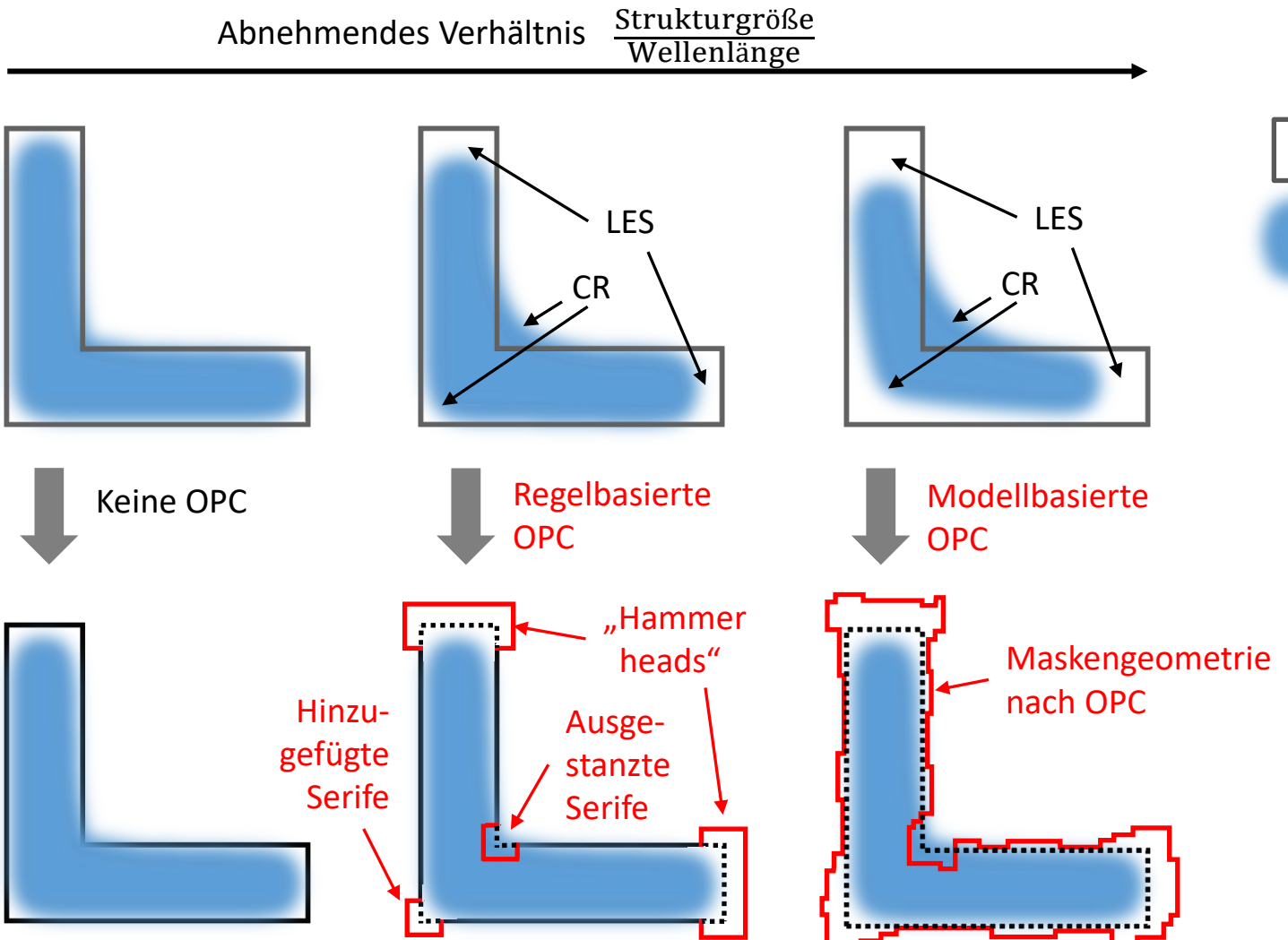










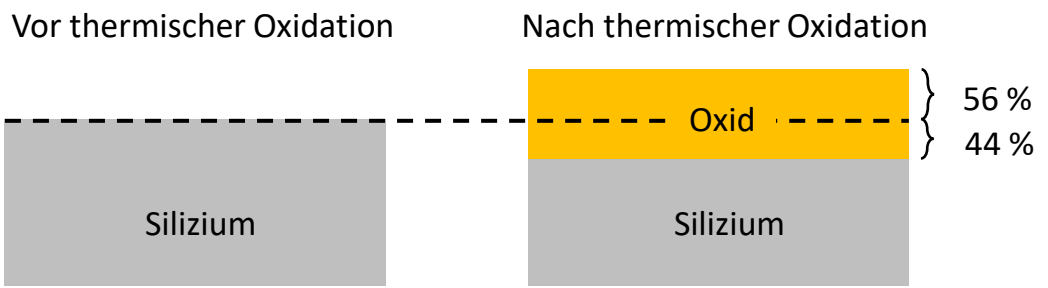


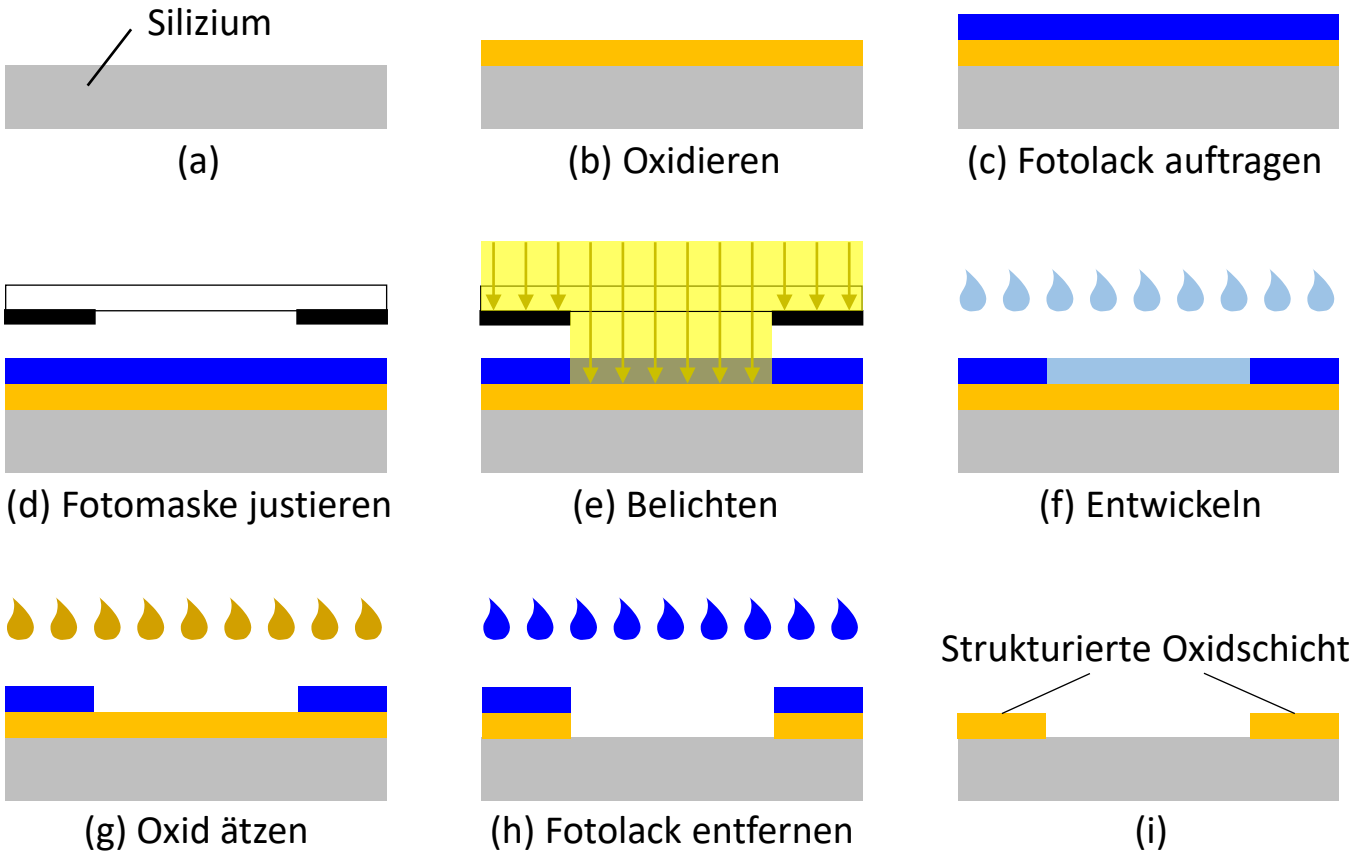
Gewünschte Layoutstruktur

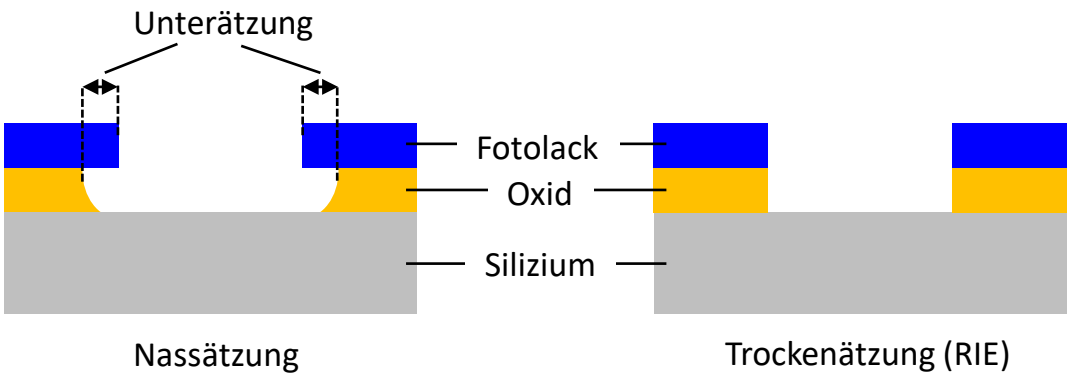
Struktur in Fotoresist

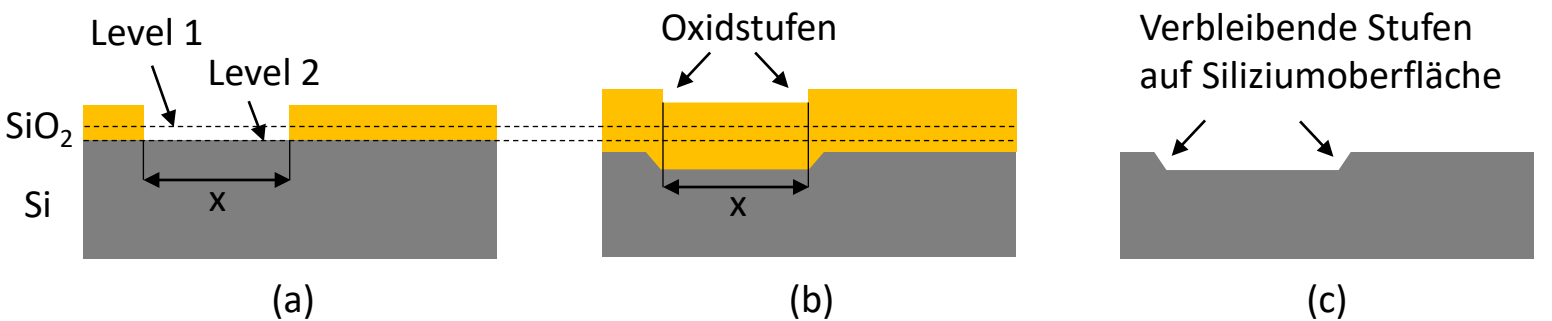
Beugungseffekte:
„Line end shortening“ (LES)
„Corner rounding“ (CR)

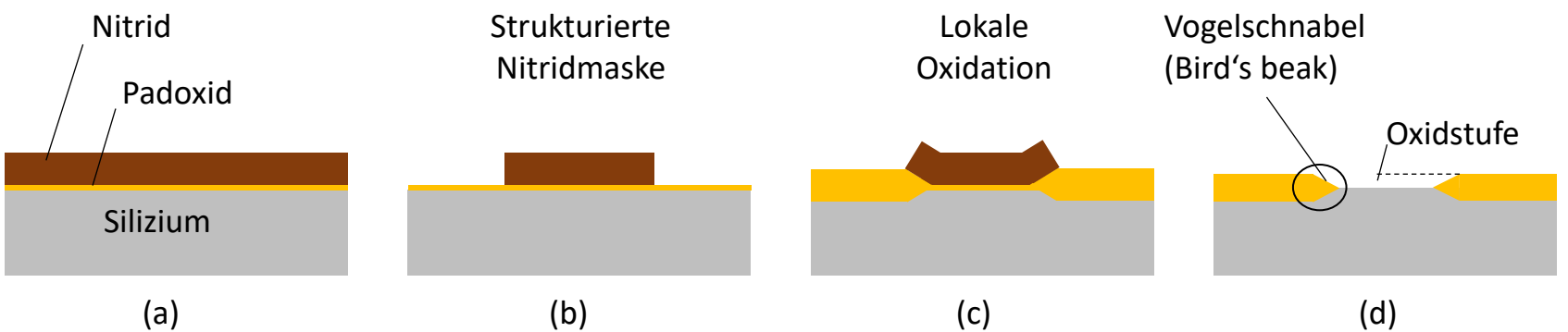
Optical proximity correction (OPC)

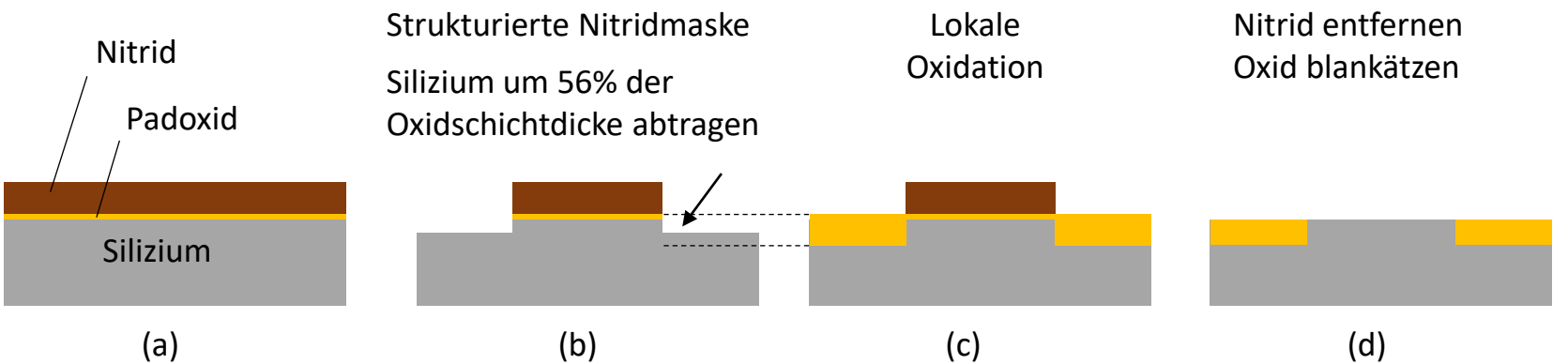


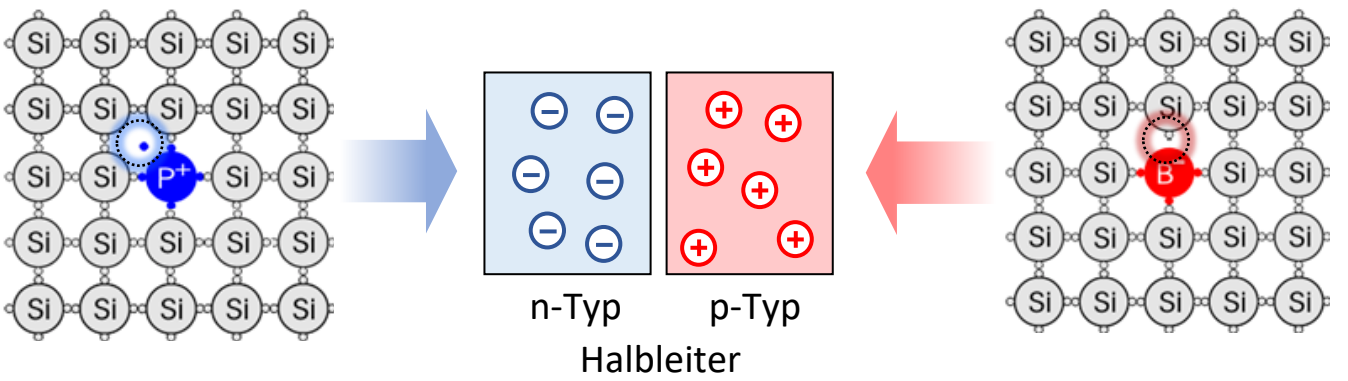


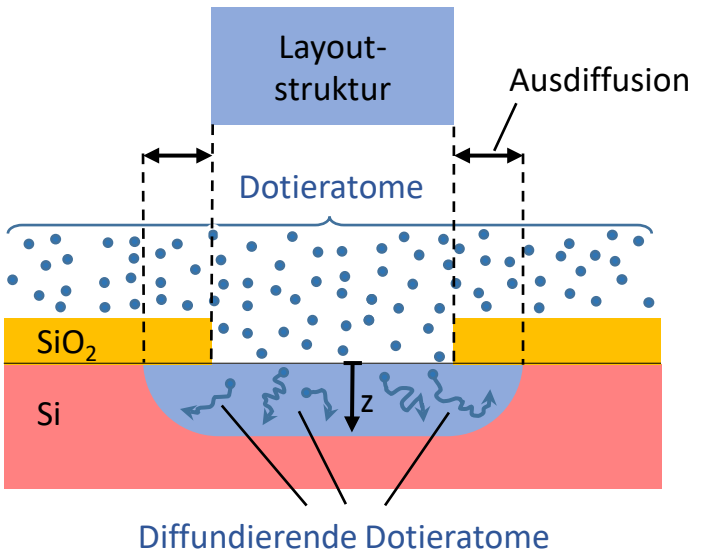


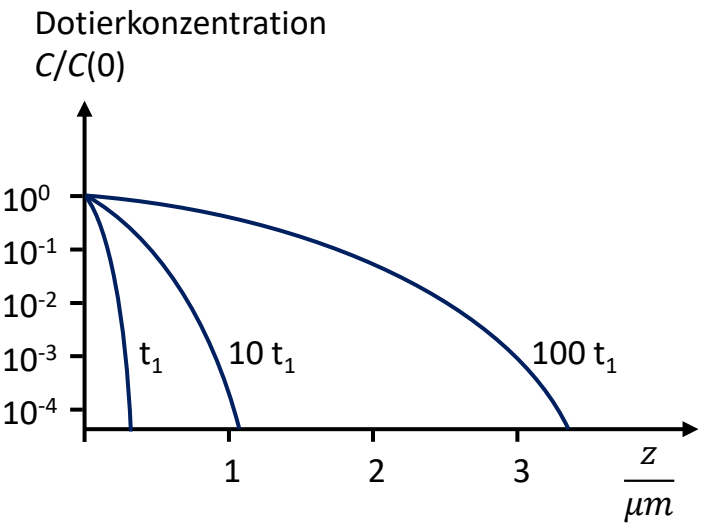


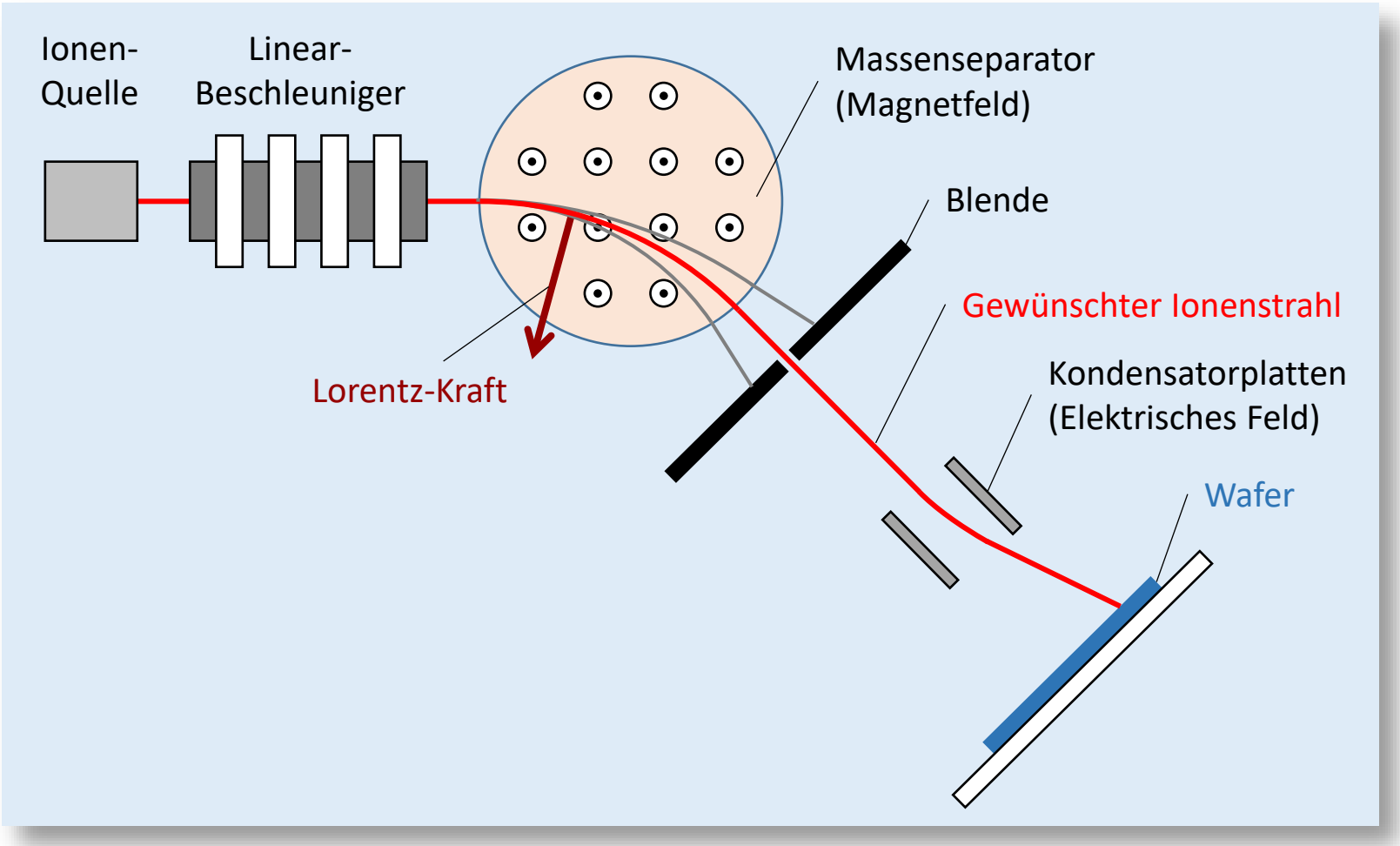


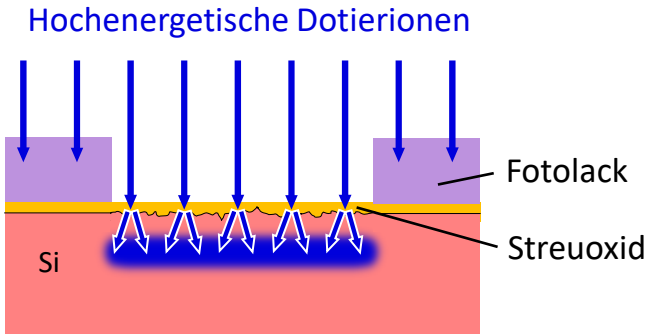




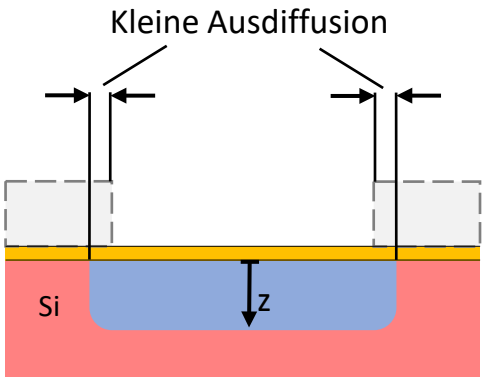




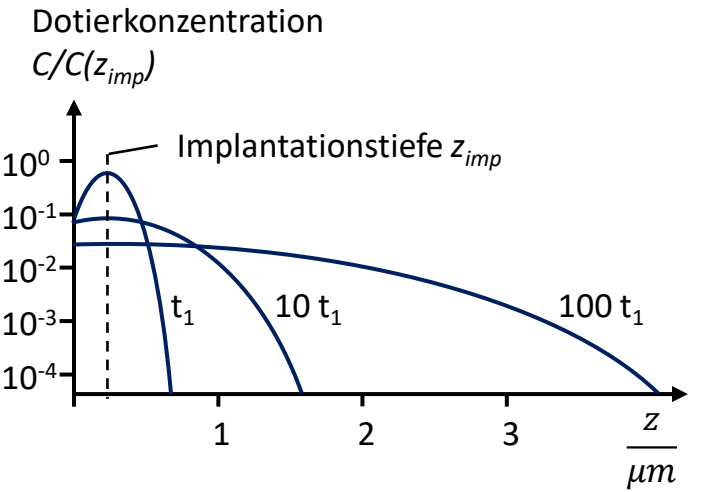


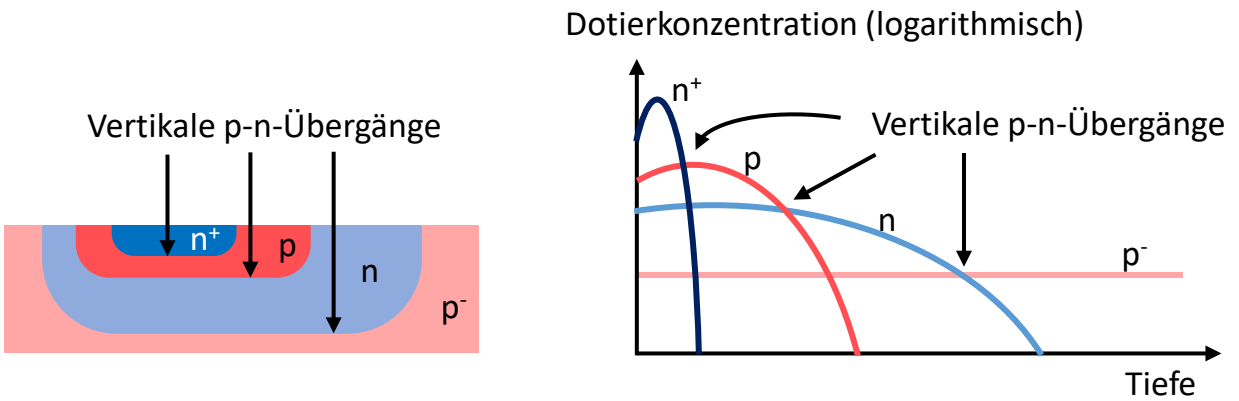


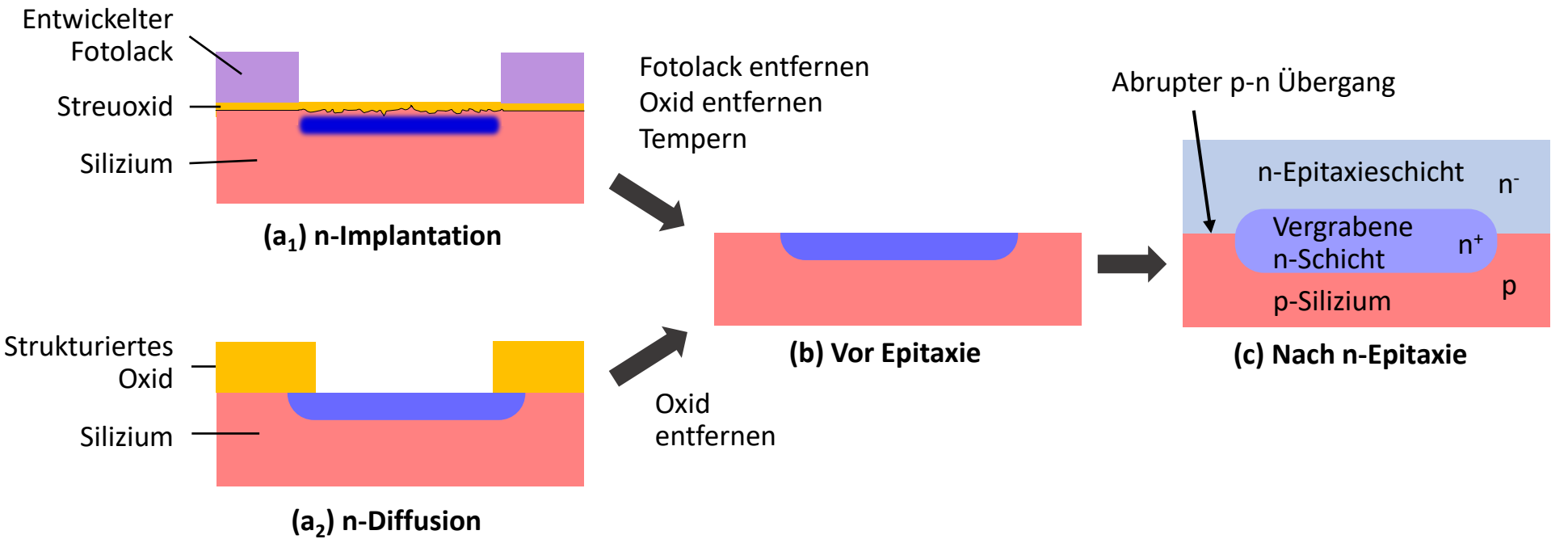
(a)

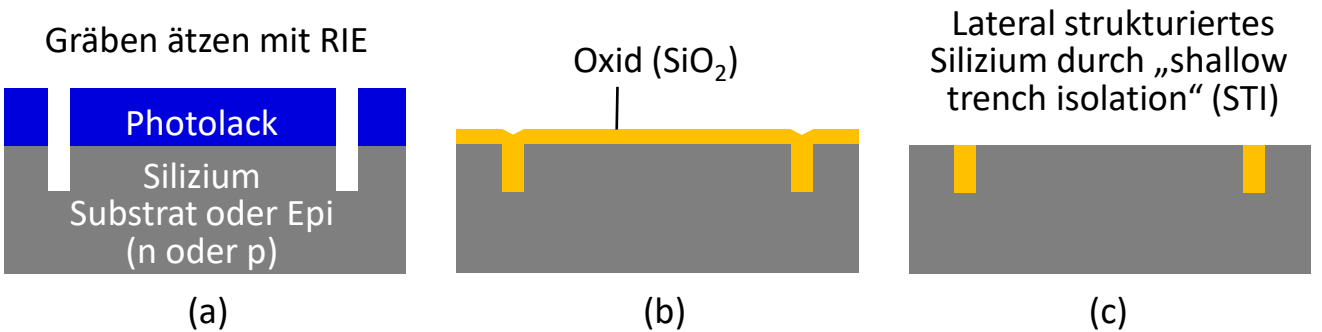


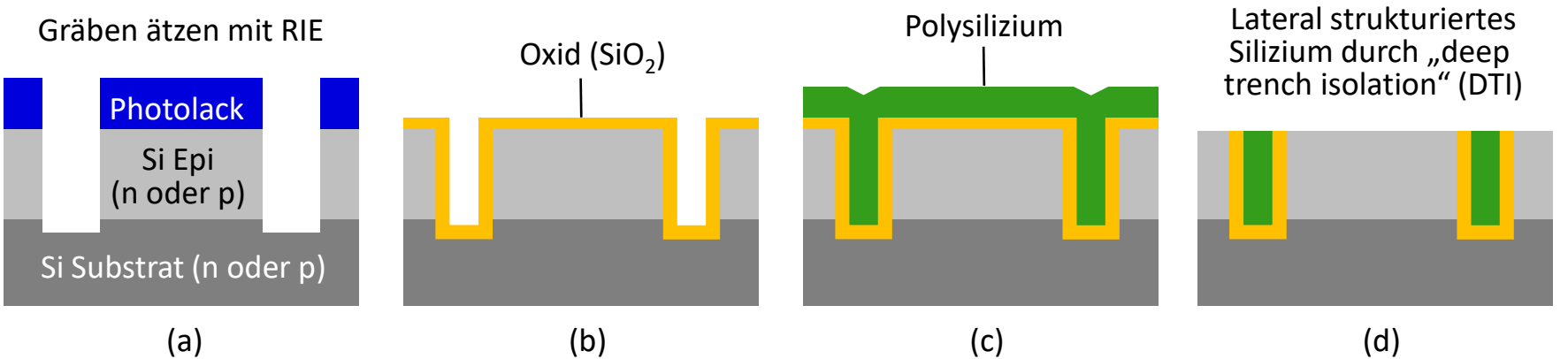
(b)





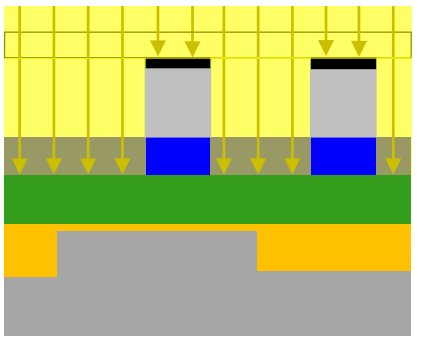




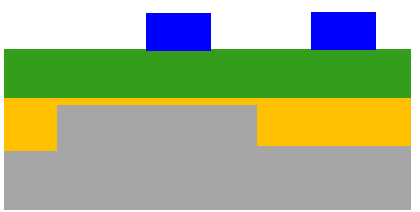


(a) Poly abscheiden

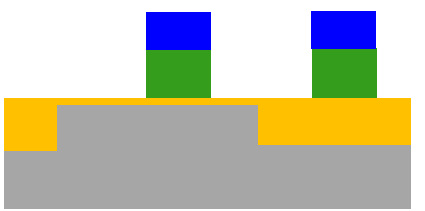
(b) Fotolack auftragen



(c) Belichten

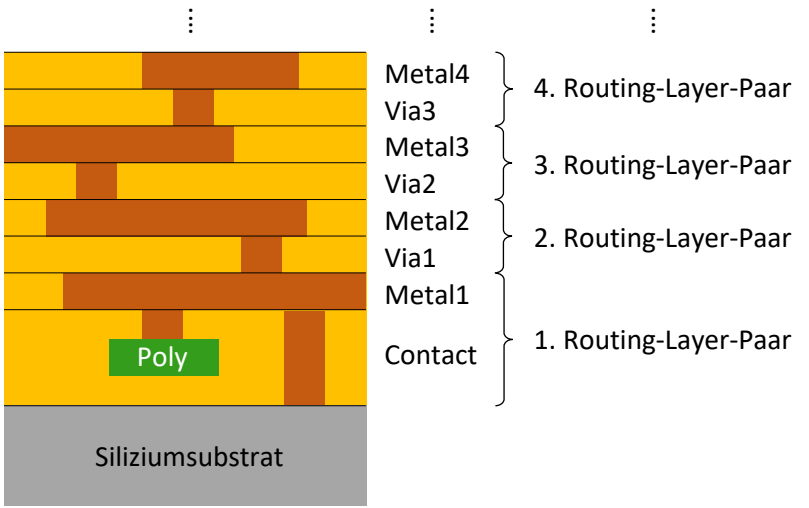


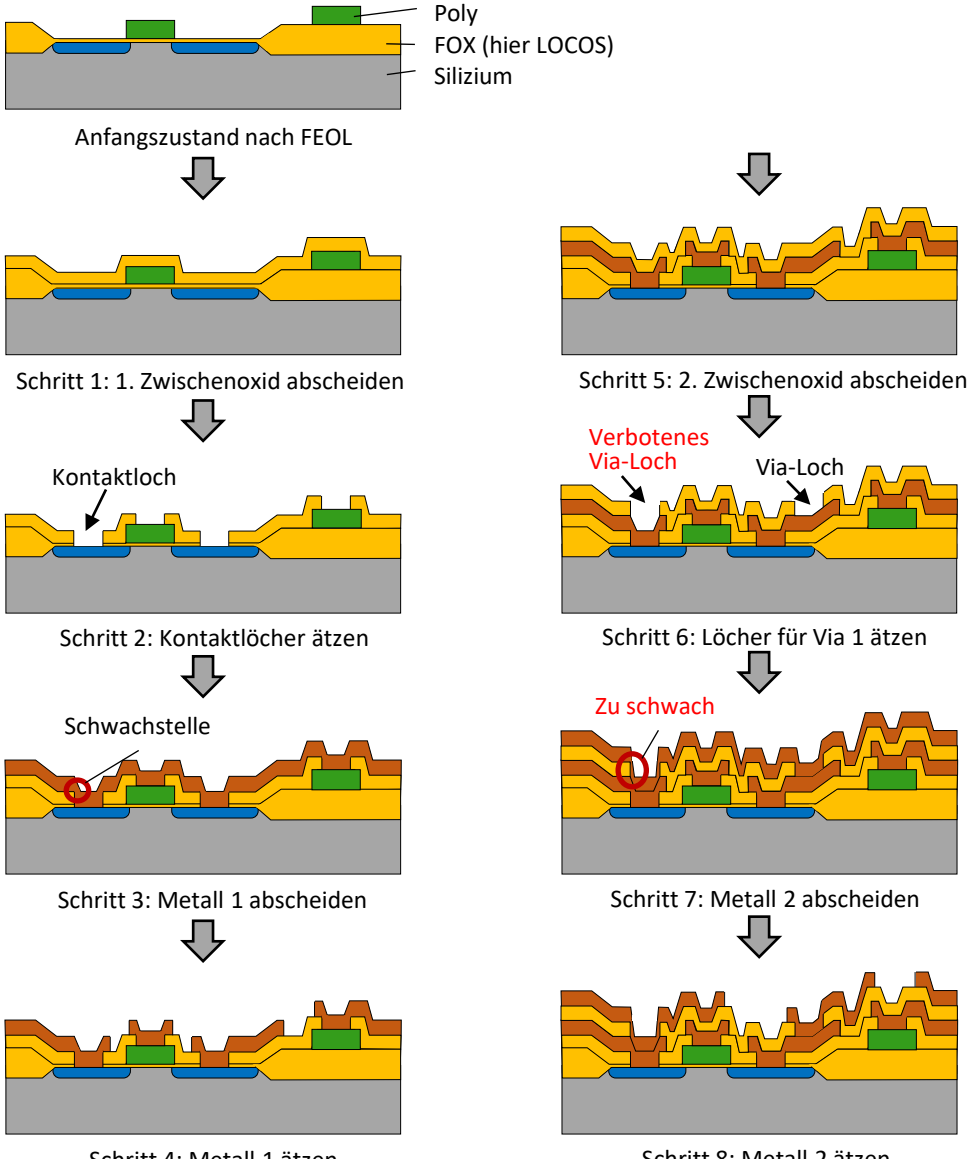
(d) Entwickeln

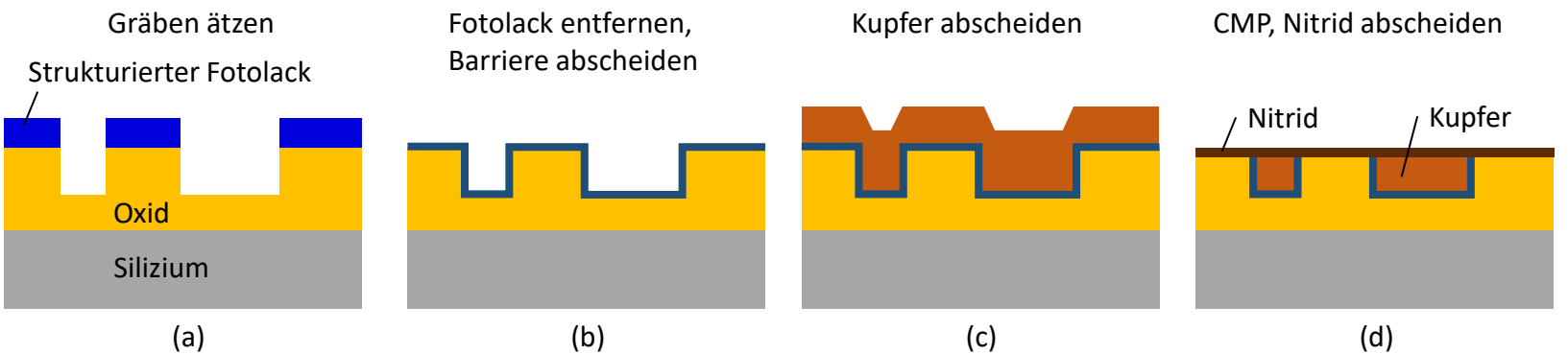


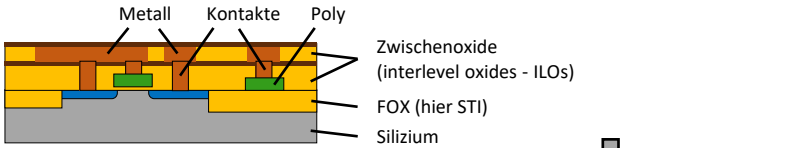
(e) Poly ätzen (RIE)

(f) Fotolack entfernen

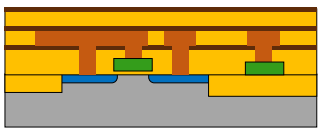




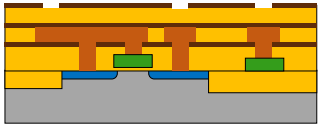




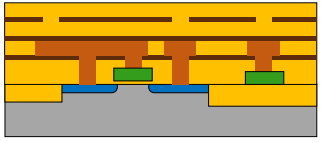
Ergebnis nach „Metal1“ im BEOL



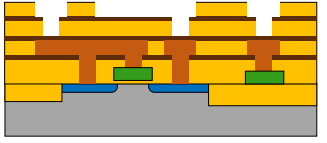
Schritt 1: Erstes Oxid; Schritt 2: Nitrid



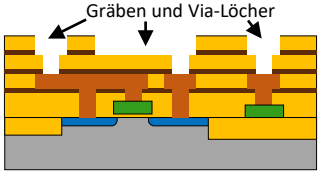
Schritt 3: Nitrid ätzen (Maske Via1)



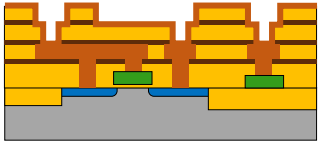
Schritt 4: Zweites Oxid



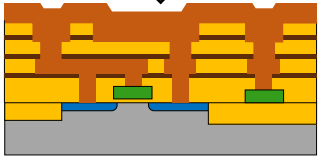
Schritt 5: Oxide ätzen (Maske Metal1)



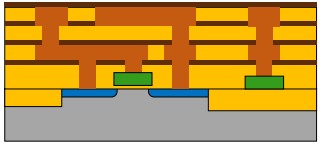
Schritt 6: Nitrid ätzen



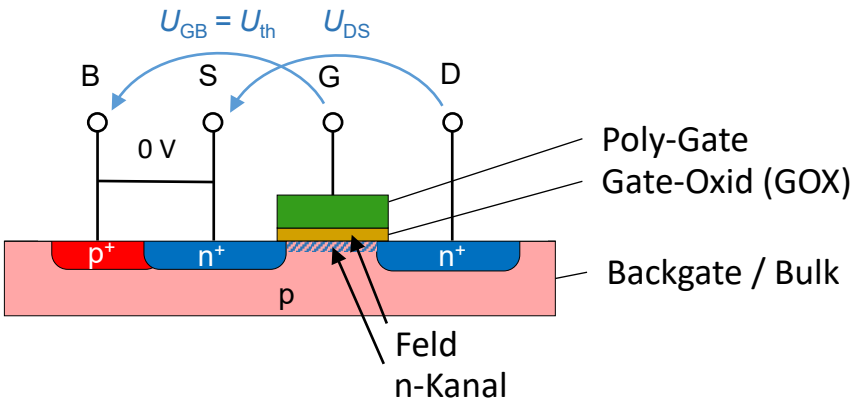
Schritt 7: Barriere + Kupferkeimschicht

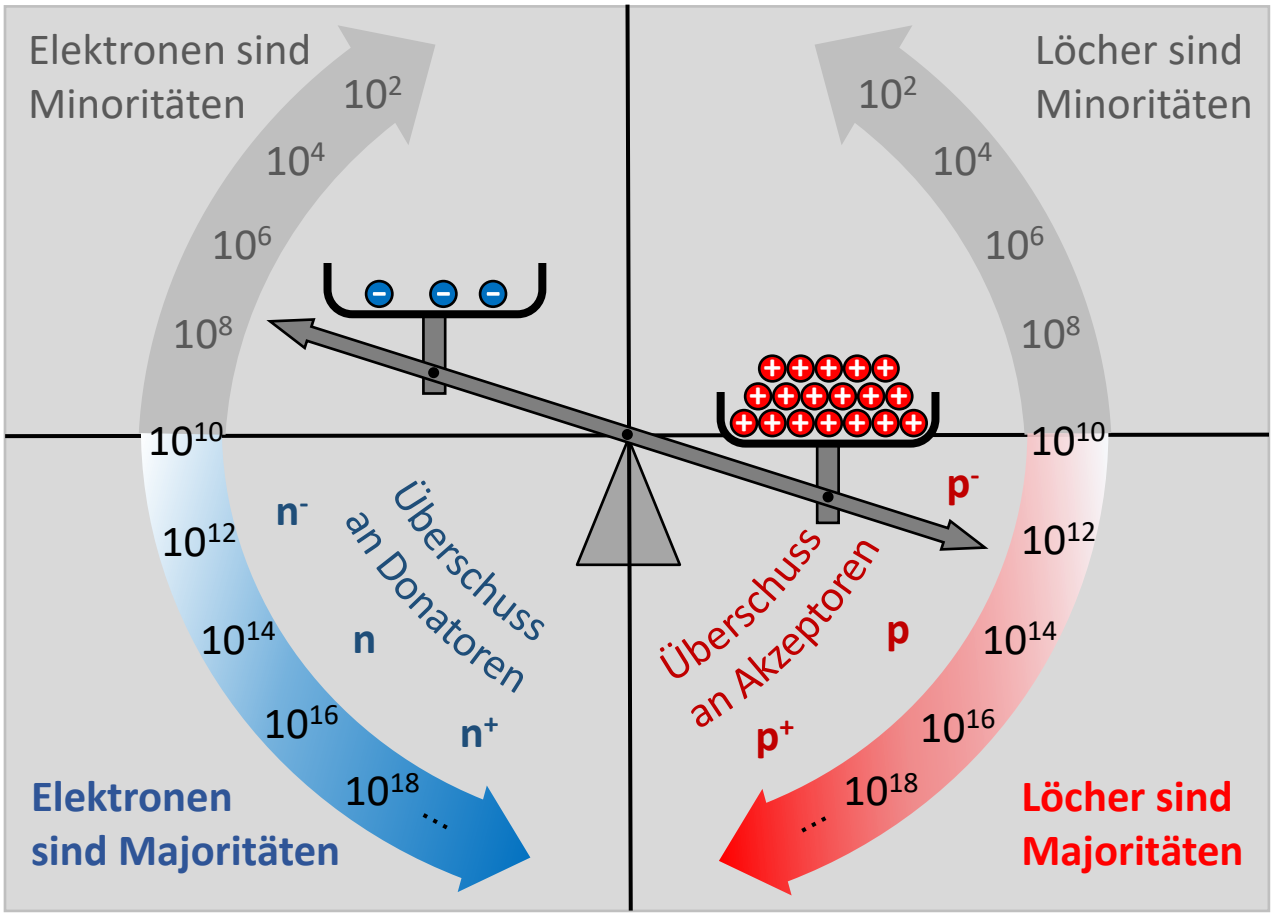


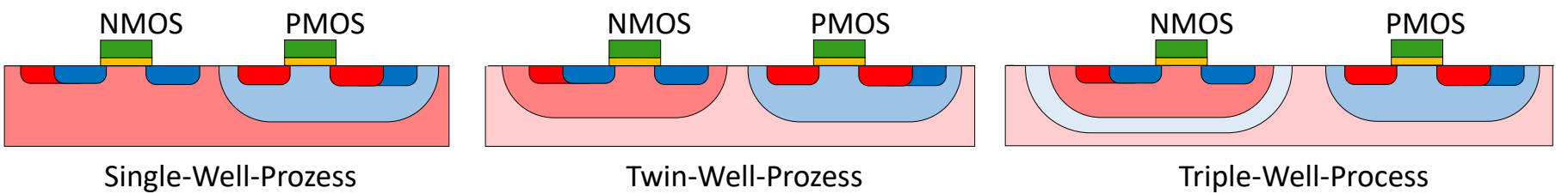
Schritt 8: Kupfer abscheiden

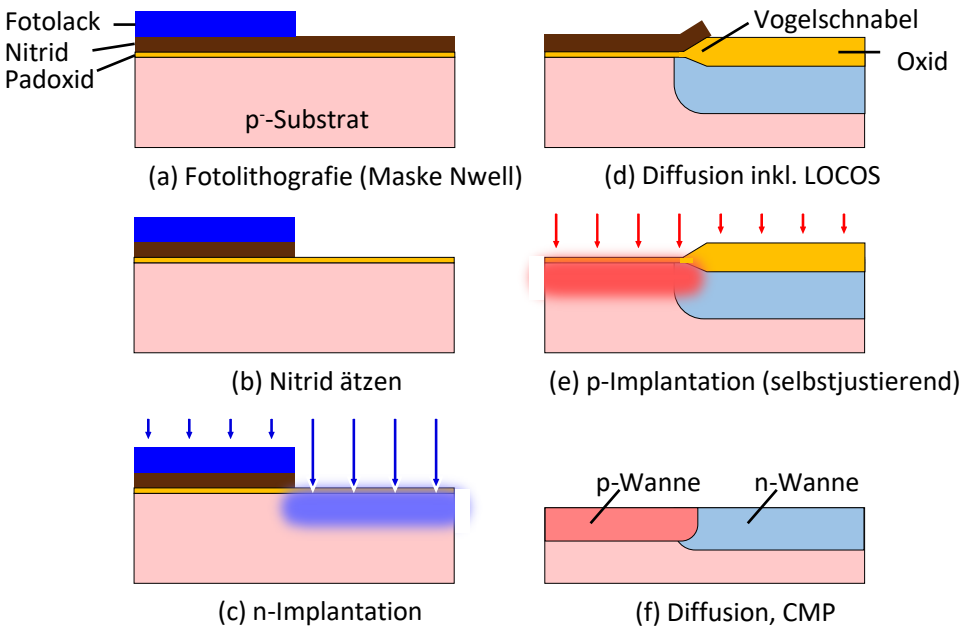


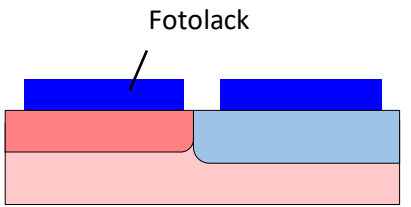
Schritt 9: CMP; Schritt 10: Nitrid



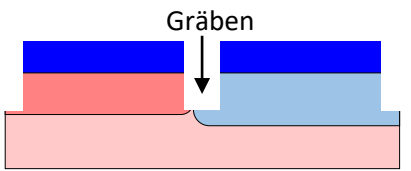




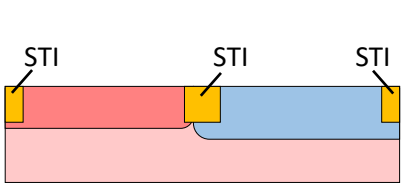




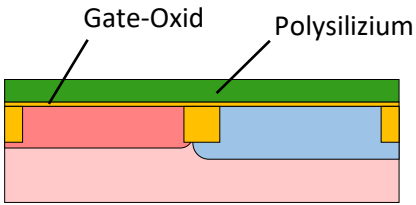
(a) Fotolithografie (Maske STI)



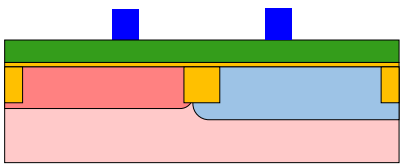
(b) Gräben für STI ätzen



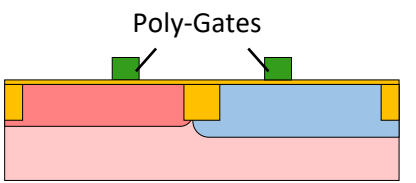
(c) Gräben für STI oxidieren, CMP



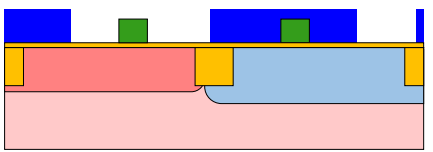
(d) Gate-Oxid und Poly abscheiden



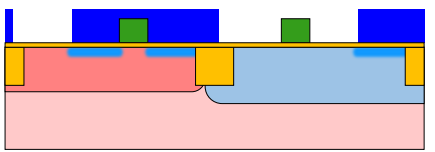
(e) Fotolithografie (Maske Poly)



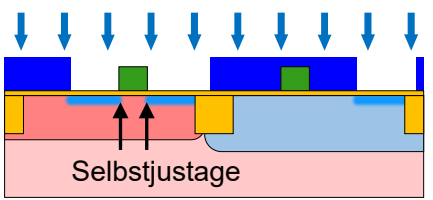
(f) Polysilizium ätzen



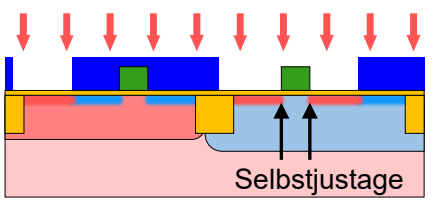
(a) Fotolithografie (Maske NSD)



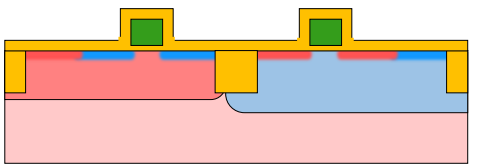
(c) Fotolithografie (Maske PSD)



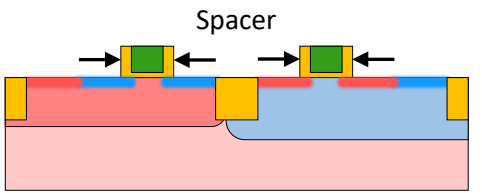
(b) n-Implantation (LDD)



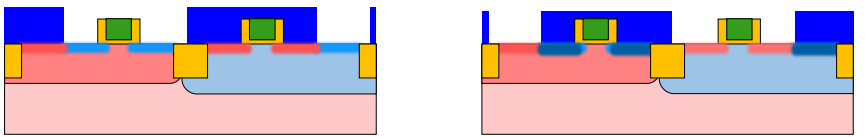
(d) p-Implantation (LDD)



(a) Oxidation durch CVD

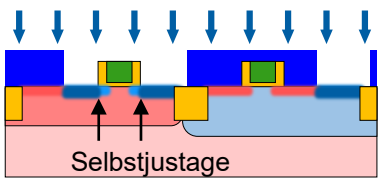


(b) Oxid ätzen

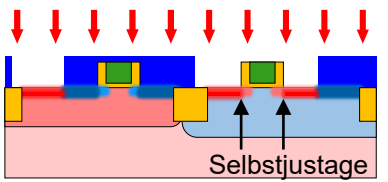


(a) Fotolithografie (Maske NSD)

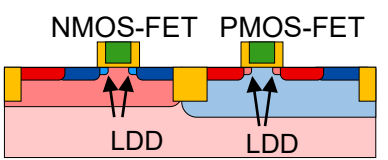
(c) Fotolithografie (Maske PSD)



(b) n^+-Implantation



(d) p^+-Implantation



(e) Diffusion