Coatings on aluminum substrates for the infrared range

Type of coating	Reflection NIR	Temperature resistance	Resistance to moisture	Resistance to temperature changes	Change in reflection behavior due to environmental influences
Copper	+++	++	-	+	+*
Aluminum protected	+	++	++	+	++
Silicon-reinforced aluminum	++	+	+	+	+++

*except in damp conditions

Why these options may be a suitable alternative to gold coatings in NIR:

- **Copper coatings (Cu):** Copper-based coatings are characterized by particularly high reflectivity in the near-infrared range (NIR) and offer stable performance even under extreme temperature fluctuations. However, due to their comparatively low moisture resistance, they are only suitable for limited applications in humid environments, as long-term contact with moisture can structurally impair the coating.
- **Aluminum coatings (Al+SiO2):** Aluminum coatings offer a slightly lower level of reflectivity compared to copper or silicon-reinforced variants. However, they impress with their high resistance to long-term environmental influences and are therefore particularly suitable for robust operating conditions.
- **Silicon-reinforced coatings (Al+Si):** Coatings with silicon reinforcement offer improved reflection performance compared to standard aluminum coatings, especially in the NIR range. In addition, they ensure consistently high reflection stability even after prolonged exposure to environmental influences.