Small-molecule organic fluorophores spectrally active in ca. 800-950 nm are cherished due to their potentials in both biomedical and material applications. However, poor chemostability, poor photostability, and high aggregation tendency have greatly limited the practical significance of existing dyes of this region. We have developed a novel family of bright near infrared dyes (ECX), which absorb and emit at ca. 880 nm and ca. 915 nm respectively and are alleviated from these aforementioned complications. Other merits of ECX dyes include transparency in the visible range, low degree of solvatochromism and easy derivatization. The key to the success of ECX dyes lies in their molecular core-shell type structure. The molecular shell has effectively shielded an otherwise unstable and aggregatable NIR-active core against incoming nucleophiles or stacking. While the ECX dyes are expected to find extensive use in a broad spectrum of downstream applications, the “molecular core-shell structure” is a powerful approach to access robust NIR dyes and deserves as much attention from the field of synthetic dye chemistry as the ECX dyes themselves.