

Red chiral carbon dots by isocyanate post-synthetic treatment

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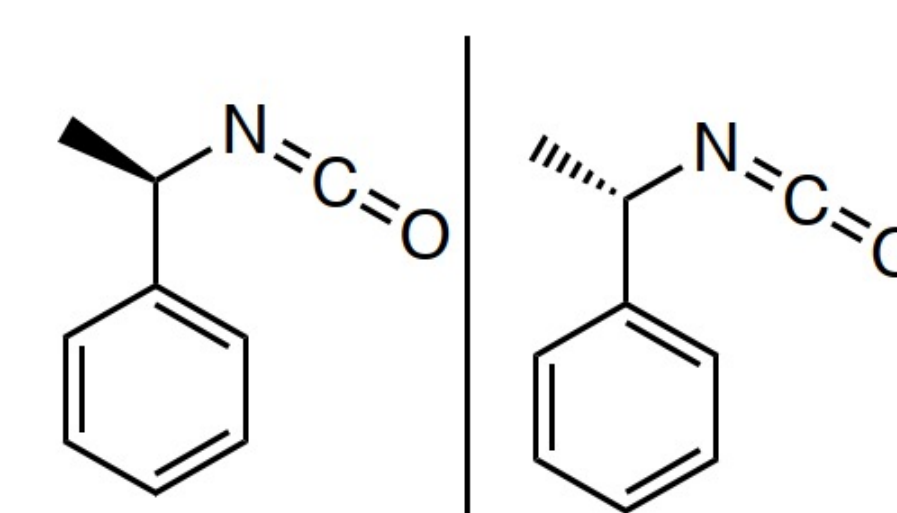
Current Red Carbon Dots

- ✓ Luminescent
- ✓ Biocompatible
- ✓ Low toxic
- ✓ Photostable
- ✗ Chiral
- ✗ Circular dichroism above 300 nm

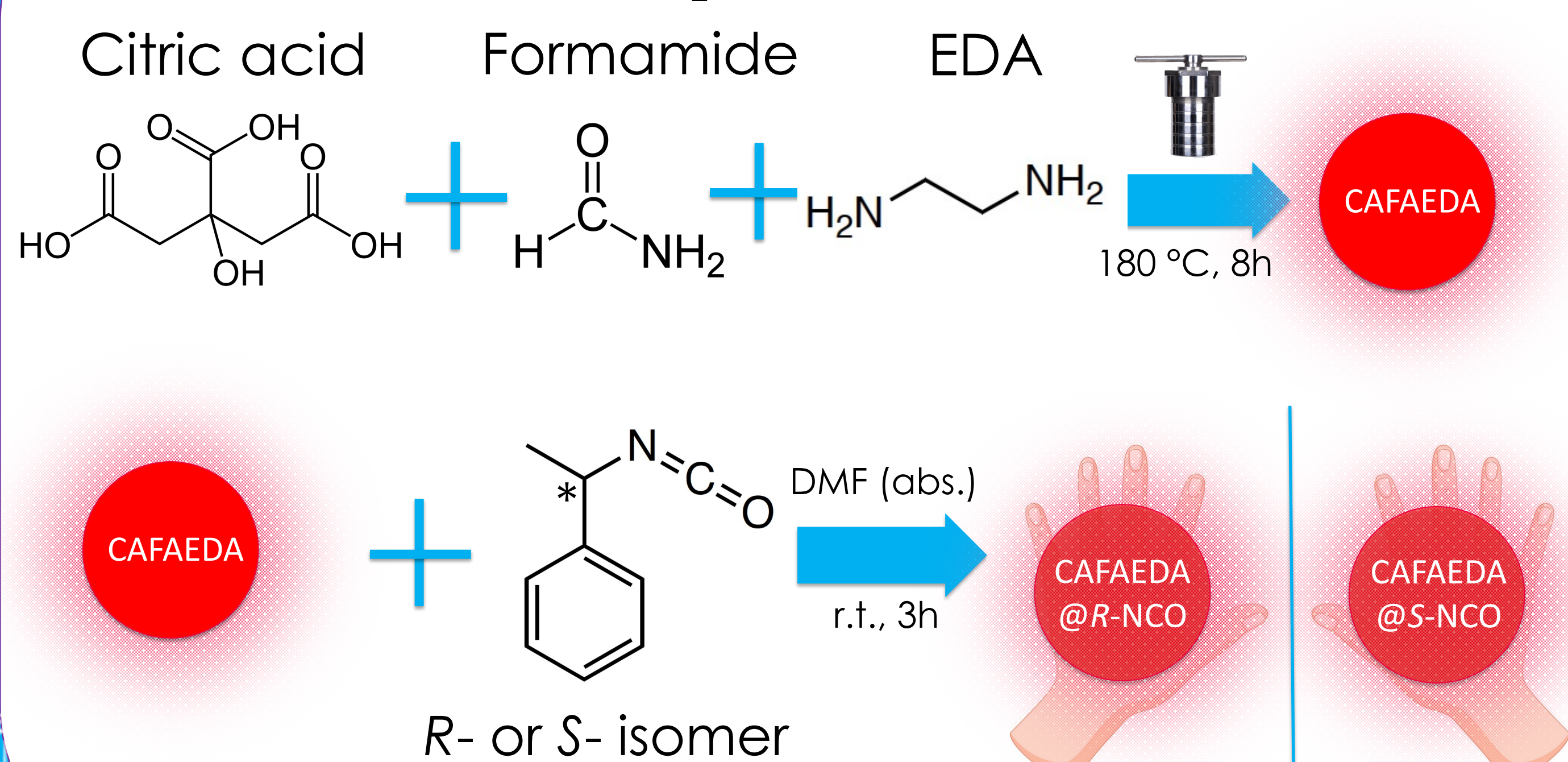


This work

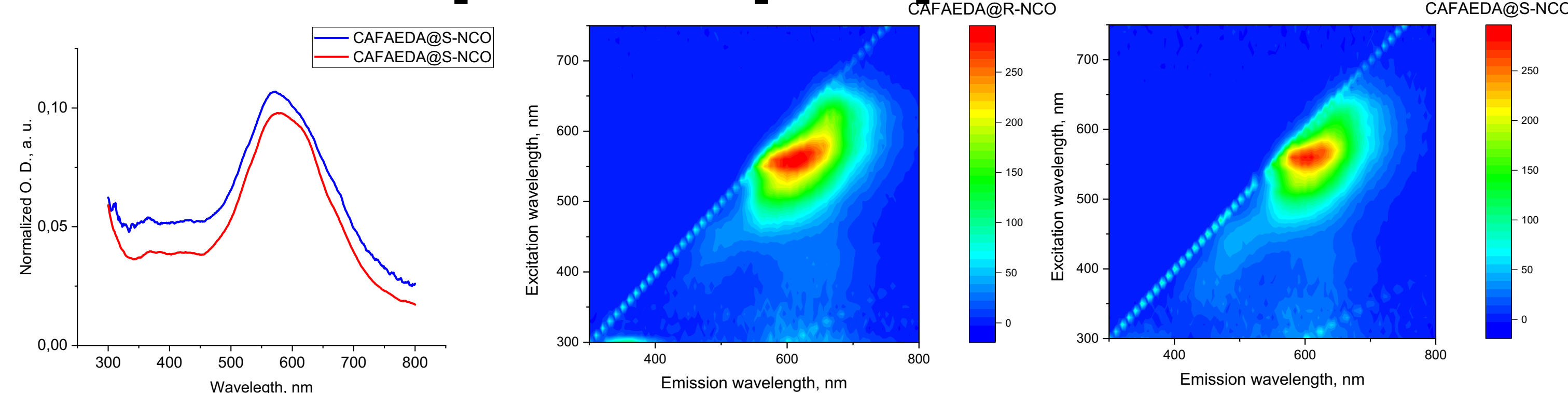
Post-synthetic chiral isocyanate treatment to achieve chiral CDs.



Synthesis



Optical properties

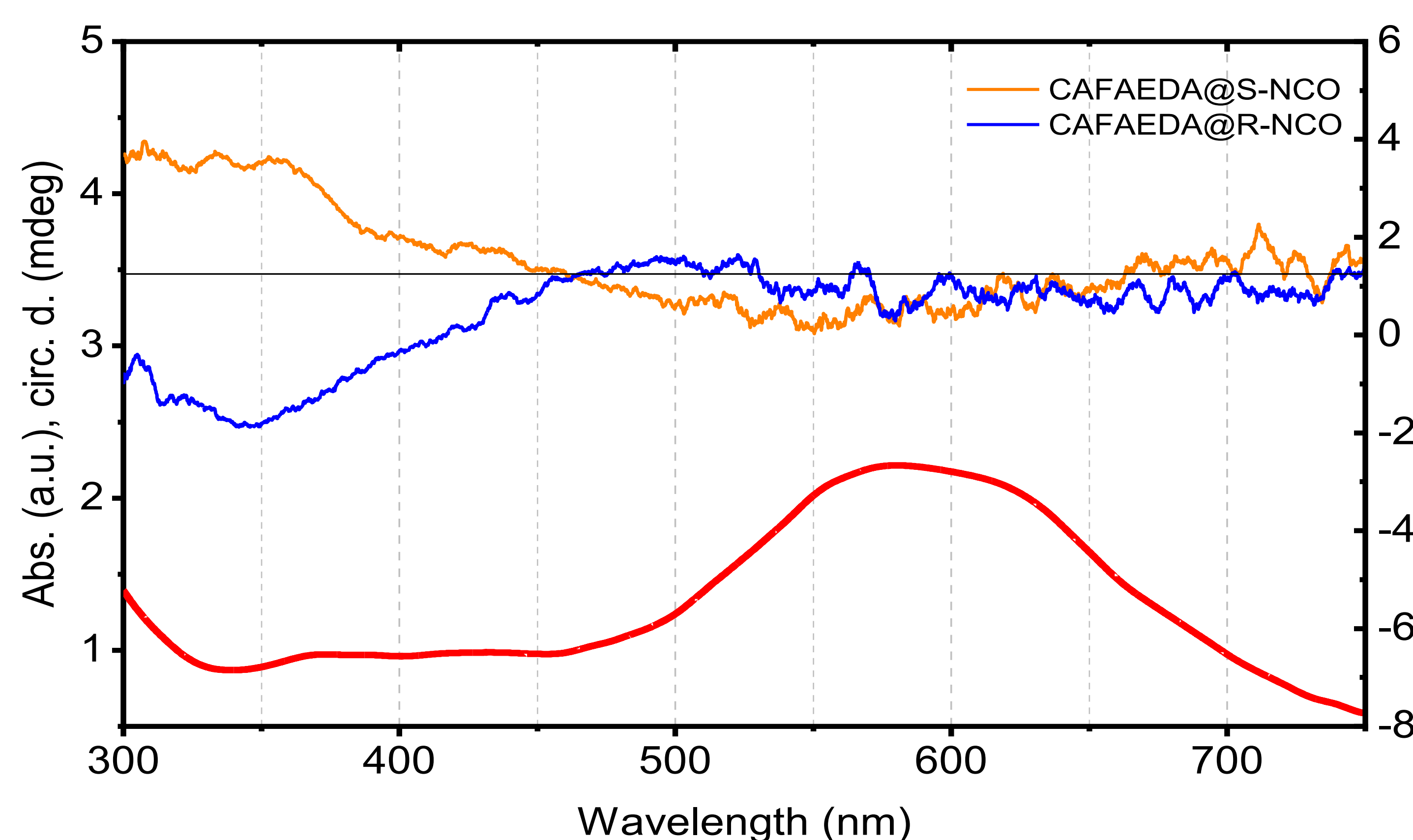


All spectra was recorded in DMSO.

Absorption: Both R-CD's and S-CD's have broad absorption band with maxima at 576 nm.

Emission: PL maps of R- and S-CD's in general are the same. Fluorescence maximum at 612 nm. QY of modified dots is 12%.

Circular dichroism spectra of the CDs



- R-CD's and S-CD's spectra a mirroring each other
- Peak position of both CD's at 346 nm
- Peak doesn't belong to intrinsic chirality of isocyanates or byproducts

$$g_{\text{abs}} = \frac{\Delta\epsilon}{\epsilon} = \frac{2(A_L - A_R)}{(A_L + A_R)} = \frac{\text{CD}[\text{mdeg}]}{(32980A)} = 8 \times 10^{-5}$$

Conclusion

- Optical isomers of the red chiral carbon dots with circular dichroism above 300 nm has been successfully obtained.

Future work:

- Chirality feature together with red emission makes them promising agents for analytically detectable selective binding with biological objects.
- Selective binding opportunity of carbon dots would be studied further.

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