Time flies so quickly as it feels like yesterday being at EMPA. Work culture over here is more or less like a European one, but overall general life is quite dull owing to its extreme chilly weather. Even in British Columbia, the winters are dark and cold with not much activity around. I am hoping that summers would be better in terms of recreational and outdoor excursions.

Addition of molecular cross-links to polymers increases mechanical strength and improves corrosion resistance. However, it remains challenging to install cross-links in low-functionality macromolecules in a well-controlled manner. Typically, high-energy processes are required to generate highly reactive radicals in situ, allowing only limited control over the degree and type of cross-link. We rationally designed a diazirine molecule whose decomposition into carbenes under mild and controllable conditions enables the cross-linking of essentially any organic polymer through double C–H activation. The utility of this molecule as a cross-linker was demonstrated for several diverse polymer substrates (including polypropylene, a low-functionality polymer of long-standing challenge to the field) and in applications including adhesion of low–surface-energy materials and the strengthening of polyethylene fabric.

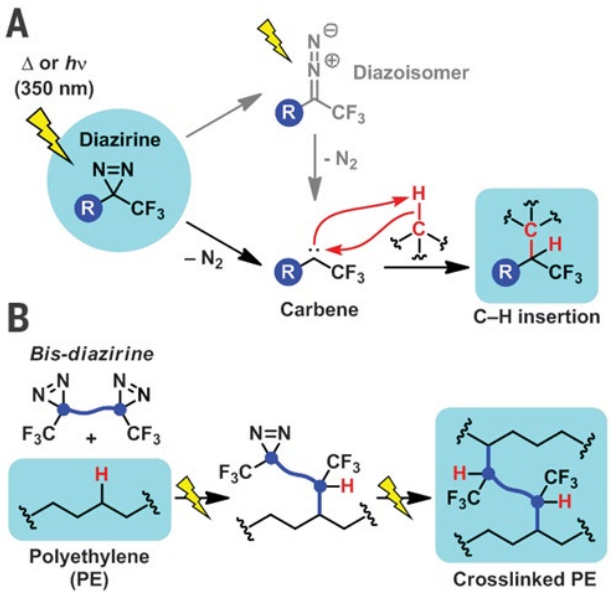

Fig. 1. A bis-diazirine strategy for polymer crosslinking. (A) Mechanism of carbene formation from the light- or heat-promoted decomposition of diazirines, followed by C–H insertion. UV, ultraviolet light. (B) Cross-linking of non-functionalized polymers through double C–H insertion of bis-diazirines.

I am helping to improve the synthetic access to bis-diazirine polymer crosslinker through the development and optimization of a more efficient synthetic route that can be used for commercial production. We have partial success and we applied for a patent.

Regards Rashid