Statement of Research Achievements

(Statement of Research Achievements, if any, on which any Fellowship has already been Received by the Applicant. Please also upload brief citations on the research works for which the applicant has already received the fellowships)

I was awarded the ERASMUS+ fellowship by the European Commission to work at the Freie Universität Berlin, Germany. During this fellowship, my research focused on the preparation and applications of amphiphilic drug delivery nanocarriers for cancer cells. I developed various molecular and polymeric amphiphiles that self-assembled in aqueous media to form nano-sized aggregates. These nanocarriers were successfully loaded with model hydrophobic dyes and anticancer drugs, optimized for delivery into cancer cells, and designed for controlled release under both internal and external stimuli. This research led to significant advancements in understanding the physicochemical behavior of these systems and their potential for targeted drug delivery, contributing to more effective and biocompatible cancer therapies.
The fellowship resulted in three peer-reviewed publications and two review articles, which have collectively been cited over 100 times according to Google Scholar.

1. **B. Parshad**, P. Yadav, Y. Kerkhoff, A. Mittal, K. Achazi *et al.* Dendrimers-based micelles as Cyto-compatible Nanocarriers. *New. J. Chem*. **2019**, *43*, 11984-11993.
   Summary: This study focused on the preparation of dendritic architectures using biocompatible materials to create nano-sized aggregates for drug delivery. The dendrimers demonstrated efficient self-assembly in aqueous solutions and low cytotoxicity, making them potential carriers for drugs and imaging agents.

2. Krishna, **B. Parshad**, K. Achazi, C. Böttcher, R. Haag, S.K. Sharma. Newer Non-ionic A_2B_2-Type Enzyme-Responsive Amphiphiles for Drug Delivery. *ChemMedChem* **2021**, *16*, 1457.
   Summary: This research involved the preparation of enzyme-responsive non-ionic gemini amphiphiles using a chemoenzymatic approach. The amphiphiles showed effective self-assembly and nanotransport potential for hydrophobic drugs, with enzyme-responsive behavior facilitating targeted drug release.

3. **B. Parshad**, M. Kumari, K. Achazi, C. Böttcher, R. Haag, S.K. Sharma. Chemo-Enzymatic Synthesis of Perfluoroalkyl-functionalized Dendronized Polymers as Cyto-compatible Nanocarriers for Drug Delivery Applications. *Polymers* **2016**, *8*, 311.
   Summary: In this study, we compared the fluorinated polymers with their non-fluorinated analogs, in terms of their aggregation behavior, drug solubilization capacity, and release profiles by loading curcumin and dexamethasone. The results showed that the fluorinated polymers provided better drug stabilization in the absence of an enzyme and exhibited a faster release when the enzyme was present. The study also demonstrated that these fluorinated polymers have excellent cyto-compatibility, with up to 95% cell viability in HeLa cells.

4. **B. Parshad**, S. Prasad, S. Bhatia, A. Mittal, Y. Pan *et al.* Non-ionic small amphiphile based nanostructures for biomedical applications. *RSC Advances* **2020**, *10*, 42098-42115.
   Summary: This review highlighted the self-assembly of non-ionic amphiphilic architectures into various nanostructures and their applications in biomedicine, focusing on factors influencing self-assembly and potential uses in drug delivery and cell imaging. It highlights the recent advancements in understanding the self-assembly behavior of these non-ionic amphiphiles and their potential in biomedical fields.

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5. Mittal, Krishna, Aarti, S. Prasad, P.K. Sharma, S.K. Sharma, **B. Parshad**.* Self-assembly of carbohydrate-based small amphiphiles and their applications in pathogen inhibition and drug delivery: A review. *Materials advances* **2021**, *2*, 3459-3473.
   Summary: This review focuses on the use of carbohydrate-based small amphiphiles in biomedical applications, emphasizing their biocompatibility, biodegradability, and versatility in chemical modification. These carbohydrates play crucial roles in biological processes like immune response and cell signaling, making them ideal candidates for incorporation into amphiphilic architectures. The review highlights recent advancements in the self-assembly of these amphiphiles into various nanostructures in aqueous media, examining their supramolecular behavior and potential applications in pathogen inhibition and drug delivery.